ZSTEM 320

VT Emulation for MS-DOS

ZSTEM 320

DEC VT320 Terminal Emulator

User Manual

Version 1.0
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CONTENTS

Introduction

Congratulations on becoming a ZSTEM user! ZSTEM 320 brings all the features of a VT320 terminal to your IBM PC or compatible. You can now access powerful software designed for your VAX or UNIX host directly from your PC. You can also perform local processing on your PC and use ZSTEM to transfer files easily to and from any computer.

ZSTEM 320 emulates all the features of the VT320 terminal.

ZSTEM's text features include true representation of all character attributes (bold, blink, underline and inverse), downloadable fonts, user-defined keys and national replacement character sets.

Advanced features of ZSTEM allow you to perform error correcting file transfer between machines, write powerful script programs and remap any key on your keyboard.

ZSTEM can be used to connect your PC directly to a host, or to connect your PC to a host via numerous local area networks. For your convenience, support for network software is included in the standard package.

Welcome to ZSTEM!

How to Use This Manual

Don't be afraid of the size of this manual. Most users will only have to read a few chapters. Chapters have been arranged by task for easy reference. For best results, all users should read the "Installing ZSTEM" and "Using ZSTEM" chapters. These chapters will tell you how to install ZSTEM on your PC, how to give ZSTEM commands, and how to change and save ZSTEM's operating parameters. In most cases your PC will then be ready to communicate with your host. Users with particular communications or network requirements should read the "Communications" chapter.

The following chapter tells you more about the specific terminal you want to emulate: the VT320 or the VT100. It describes the special features of these terminals, and how they are implemented on the PC.

The "Display," "Keyboard," and "Printer" chapters tell how you can set up your PC to perform these terminal functions. They describe each function and point out differences between your PC and a real terminal.

Users wishing to send simple text files over short distances should read the "Simple File Transfer" chapter. Users wishing to send binary files, or to send files over noisy communications lines, should read the "Error-Corrected File Transfer" chapter. The "Softkeys" and "Phone Directory" chapters show you how to program time-saving sequences into a single key.

More technical users will be interested in the "Operating System Environment," "Programmer's Reference" and "Troubleshooting" chapters.

The following tools should help you quickly find any information you require in the manual. You will find a tabbed cross-reference to each chapter at the front of the manual. The comprehensive "Contents" at the beginning of the manual, and individual tables of contents at the start of each chapter, list primary subject material. Finally, the index at the end of the manual lets you quickly find page references for any topic.

Conventions Used in This Manual

Throughout this manual, the following conventions have been used to help you distinguish between different types of text:

- All key names are shown in small capital letters. For example, the Control key appears as CTRL, the Escape key as ESC.
- A pair of keys joined with + indicates you must hold down the first key and then press the second key, for example: ALT+Z. A sequence of keys joined by commas indicates that you must press and release each in order, for example: press A, T, RETURN.
- Within the normal paragraphs of this User Manual, specific text which you are to type is shown in bold capital letters. It is not necessary that you actually type using capitals. Placeholders for items which you supply yourself are shown in italics. For example, you might be told to type **SAVE** *filename*.
- Within the normal paragraphs of this User Manual, configuration screen items and their values are shown in bold. For example the Display Configuration screen item **Display Adapter** usually has the value **Automatic**.
- Within the normal paragraphs of this User Manual, messages and prompts which will appear on your screen are shown in quotes. For example the prompt "ZSTEM?" is often described.
- In examples and procedure steps, text as it appears on your screen is shown in a monospace font. This may be system prompts or characters that you have typed. Although not shown as such, you normally terminate the lines that you type with RETURN. For example:

  ```
  ZSTEM? softkey
  ```

The PowerStation Keyboard

KEA's PowerStation keyboard is a VT-style keyboard that plugs into your IBM PC or compatible. It is an optional accessory to ZSTEM 340 and ZSTEM 320 software. When used with these packages, it virtually eliminates keyboard remapping, as each key is positioned exactly as it is on a real VT terminal. Both VT and PC functions are clearly marked on the keys, for easy use both with ZSTEM and other PC programs.

What You Should Know

This manual assumes you have a basic knowledge of the IBM PC and MS-DOS. If you are a novice PC user, you should read through your MS-DOS and PC manuals prior to using ZSTEM. You should also have these manuals available for easy reference during ZSTEM use.

To connect your PC to your host, you must know the specific characteristics that your host has set for your terminal. ZSTEM assumes the most commonly used terminal characteristics. If ZSTEM's default characteristics are not suitable, you may have to consult your host system administrator for details.

Important Information

Registration Card

You will find a ZSTEM Registration Card included in your package. To ensure that you are eligible for technical support, please complete this card and mail it in to us as soon as you install your software. We can then inform you about upgrades and new versions of your software.

License Agreement

By opening your diskette envelope, you are agreeing to the terms and conditions of the ZSTEM License Agreement. Remember, when you buy a ZSTEM package, you are buying a license to use ZSTEM on a single system. If you wish to use ZSTEM on more than one system, you must either buy additional packages or a multicopy or network license. Please contact our sales desk for information on multi-system licensing.

Upgrades

Upgrades to future versions of ZSTEM, or to upwardly compatible products, can be ordered at any time. Please contact the ZSTEM sales desk for more information. (Remember: If you send in your registration card we will be able to notify you of upgrades and new versions of your software).

Technical Support

Registered users of ZSTEM products can contact our technical support staff by telephone at (604) 431-0727 between 8 a.m. and 5 p.m. Pacific Time, or by fax at (604) 431-0818. Before contacting us, please refer to Chapter 15 for helpful information on problem solving and technical support procedures.

Installing

Chapter

2

Installing ZSTEM

Introduction

The installation procedure allows you to make a working copy of ZSTEM on either your hard disk or a diskette. This chapter explains the steps you should take prior to, and during the installation of ZSTEM.

In its basic configuration ZSTEM supports most popular hardware. ZSTEM also supports many specialized communication, printer and video devices by its special files called loadable drivers. You must specify all of the device drivers you want available in your working copy of ZSTEM by selecting them in the installation procedure.

The installation procedure also allows you to choose default values for many of ZSTEM's configuration items. These values determine how ZSTEM is configured upon startup, and can be easily changed from within ZSTEM. See the section "Changing Your Defaults" at the end of this chapter for more details.

To change the loadable drivers that you have made available to your working copy of ZSTEM during installation, see the "Changing Your Loadable Drivers" section in this chapter.

What You Need

Before installing ZSTEM, you must determine that you have all of the components necessary for ZSTEM to function properly. ZSTEM requires the following items:

- IBM PC, XT, AT, PS/2 or compatible.
- at least 240 K of available memory.
- one serial port, internal or external modem, or network board.
- a monitor and an appropriate graphics adapter: CGA, EGA, Hercules, MCGA, MDA, VGA, XGA or good compatible.

- one diskette drive.
- MS-DOS version 2.0 or later.

Installation

Install Checklist

The installation procedure will prompt you for information about your system configuration. You should familiarize yourself with the following components of your system before proceeding with the installation:

- the type and manufacturer of your video adapter.
- the way you wish to connect to your host; either the name of your serial port, or the network software you are using.
- the type of printer you are using for text.
- the type of keyboard that is plugged into your PC.
- the language you will select for your keyboard and display.

Making a Backup

Before installing ZSTEM, you should make a backup copy of your ZSTEM diskette(s).

Label each diskette with the program name, version number, serial number and date. Then store the backup copy in a safe place.

ZSTEM Loadable Drivers

The ZSTEM installation procedure allows you to select special loadable device drivers which are then available to your working ZSTEM program. Although ZSTEM can use up to twenty loadable drivers, you should only select the drivers necessary for your configuration. This will save memory and eliminate many irrelevant choices from your configuration screens. Should you need to change your selection of drivers after installing ZSTEM, see the "Changing Your Loadable Drivers" section at the end of this chapter.

Starting Installation

ZSTEM is available on two 5 1/4 inch diskettes or one 3 1/2 inch diskette. If you have two 5 1/4 inch diskettes, load the diskette labelled "Install and Utility Disk" in any drive. If you have one 3 1/2 inch diskette, load the "Program, Install and Utility Disk" in any drive. Then, to install ZSTEM:

- Change your default drive to the drive which holds the ZSTEM diskette. If the diskette is in A: drive you would type at the DOS prompt: **A:** and press ENTER.
- Type **INSTALL** and press ENTER

You have now started the ZSTEM installation procedure. You can quit the procedure at any time by pressing CTRL+C, or you can move backward through the procedure by pressing ESC.

With certain types of monochrome monitors, you may have to run the installation procedure with the special /M switch. If you cannot properly see the prompt line on the first installation screen, quit the procedure and repeat the above steps replacing install with **INSTALL /M**.

Installation Steps

Target Directory

The installation procedure allows you to specify the directory you want the working copy of ZSTEM to reside in. This directory will also contain any loadable device drivers you make available and any additional files ZSTEM requires.

A warning message will be given if a previous version of ZSTEM already exists in the directory you specify. If a copy of the same version of ZSTEM exists in that directory, you will be given the choice of a total or a partial installation. See the "Changing Your Loadable Drivers" section at the end of this chapter for more details.

Selecting Video Drivers

The ZSTEM program has internal support for most standard video adapters. The "Select Video Drivers" menu (figure 2.1) allows you to select drivers which support the special advanced features of some video adapters. Each selection corresponds to a special loadable driver. If you are unsure of the driver you should use, see table 6.1 in Chapter 6 for a detailed list of the video adapter/monitor combinations which ZSTEM supports.

```
                    SECTION 2: Select Video Drivers
If you do NOT need any special video adapter drivers, press ENTER.
If you do need drivers, press the letters corresponding to the special
adapter/monitor combinations you want.  You can select one or more.  Pressing
a letter a second time will de-select that driver.  Chapter 6 of the ZSTEM 320
User Manual contains further information.

 A  AHEAD EGA Wizard, Deluxe, VGA Wizard (all MultiSync)
 B  AT&T6300 and others (all Monochrome)
 C  ATI EGAWonder, Wonder 800, VIP or VGAWonder
 D  DEC Vaxmate
 E  DFI EG 3000 24/27 Mhz
 F  EGA 64K or EGA+Monochrome
 G  Genoa SuperEGA (MultiSync)
 H  IBM MCGA
 I  IBM XGA
 J  Orchid VGA and Relieye RB5155VG (MultiSync)
 K  Paradise AutoSwitch EGA480,VGA Plus,VGA16,VGA PRO
 L  Sigma VGAH (MultiSync)
 M  Tseng EVA or EVA/480 or NEC GB-1
 N  Video7 VEGA Deluxe, VEGA VGA, V-RAM VGA, FastWrite VGA
 O  VESA compatible VGA
 P  Zenith 449 VGA

Press letter(s) to make your selection, then press ENTER.
```

Figure 2.1 Installation procedure "Select Video Drivers" menu

Choosing a Default Video Adapter

The "Choose Default Video Adapter" menu allows you to choose the default video adapter ZSTEM will use for your system.

If you later change your system configuration, you could change this default by choosing a new value in the item **Display Adapter** on the Display Configuration screen. You could also change it by starting ZSTEM with the D command line switch. See Chapter 6 for more details.

Selecting Communication Drivers

The ZSTEM program has internal support for the standard serial ports: COM1, COM2, COM3 and COM4. ZSTEM also supports many different networks with its special communication drivers. The "Select Communication Drivers" menu makes any number of these network drivers available. For more information on the network software ZSTEM supports, see Chapter 4.

Choosing a Default Communication Port

The "Choose Default Communication Port" menu allows you to choose the default communication port ZSTEM will use for your system.

If you later change your system configuration, you could change this default by choosing a new value in the item **Port** on the Session Configuration screen.

If you choose other than the standard COM1 and COM2 ports, the installation procedure may prompt you for additional information. For some networks, ZSTEM may require that you supply additional values on your Session Configuration Screen. See Chapter 4 for more information on communications.

Selecting Text Printer Drivers

ZSTEM will use the printer you have chosen for printing text. ZSTEM's basic configuration supports the Epson MX, and IBM Graphics printers (and any printers which operate in those modes). Most dot matrix printers will operate as an Epson MX or IBM Graphics printer. To use other printers for text printing, you must select one of the loadable text printer drivers during installation.

Choosing a Default Text Printer Type

The "Choose Default Text Printer Type" menu allows you to choose the default text printer ZSTEM will use for your system.

If you later change your system configuration, you could change this default by choosing a new value in the item **Type** on the Text Printer Configuration screen.

Choosing a Default Keyboard Type

ZSTEM supports many different types of keyboards including the PowerStation, KEA's VT-layout keyboard. None of these keyboards requires a special driver. You should, however, choose your default keyboard type during installation. This will ensure that each key is where you expect it when you start ZSTEM.

If you later change your keyboard, you could change this default by choosing a different value in the item **Type** on the Keyboard Configuration Screen. See Chapter 7 for more information on keyboards.

Choosing a Keyboard Language

This value determines which national keyboard layout ZSTEM assumes your computer uses. The figures at the end of Chapter 7 show all national layouts; normally you will choose the language which matches the markings on your keyboard. This value also determines which of the National Replacement Character Sets (NRC sets) will be used for display if **National** mode is selected on the General Configuration screen. You can later change this default by choosing a new value in the item **Keyboard language** on the General Configuration screen.

Copying Files

At this point, the installation procedure is ready to copy your tailored ZSTEM program and the drivers you have selected to your ZSTEM directory. You are asked to confirm that you want the copying to proceed.

If you selected too many drivers during the installation procedure, you will be prompted to de-select any non-essential drivers.

Distributed Files

The loadable drivers and many utilities are in compressed format, in collections called "ZIP" files. KEA Systems Ltd. has licensed the program PKUNZIP to decompress these files. This program is supplied on the INSTALLATION disk and is copied to your target ZSTEM directory during installation. The installation process uses PKUNZIP to decompress the drivers you require; you do not have to decompress these files yourself.

The following describes the compressed contents of the various ZIP files on the ZSTEM destribution disks.

DRIVERS.ZIP	The loadable drivers. The installation process decompresss the drivers you select, converting them into standard driver files with .DRV extensions.
KEY.ZIP	Keyboard layout general help screens, an alternative mapping for the Enhanced keyboard (described in Chapter 7) and softkey examples.
EDT.ZIP	Keyboard layout help screens for using EDT with the various PC keyboards.
WPS.ZIP	Keyboard layout help screens for using WPS with the various PC keyboards.
UTIL.ZIP	Various utility files: ZKB.COM, an optional keyboard handler; ZDRIVER.COM, a driver file utility; LATDAT.COM, a utility that allows LAT connections to be maintained after you exit ZSTEM.
WINDOWS3.ZIP	Contains three PIF files for ZSTEM operation under Windows 3.0: ZSTEM320.PIF, full screen; Z320TEXT.PIF, 386 mode window for text display driver; Z320GWIN.PIF, 386 mode window for graphics display driver.

DESQVIEW.ZIP	Contains two PIF files for ZSTEM operation under DESQview: ZT-PIF.DVP, text mode operation in a window; ZG-PIF.DVP, graphics mode operation as full screen.
WP.ZIP	Several mapping files to assist you in using the VAX version of WordPerfect version 5.0 with ZSTEM. With these mapping files, you can continue to use the familiar WordPerfect PC keystrokes. The included README.WP5 gives more information about this capability.
123.ZIP	Several mapping files to assist you in using the VAX version of Lotus 1-2-3 with ZSTEM. With these mapping files, you can continue to use the familiar Lotus PC keystrokes. The included file README.123 gives more information about this capability.
WPSDOS.ZIP	Contains a document and driver files for using the PowerStation keyboard with the program WPS PLUS/DOS Version 2 and Version 3.

Copying Individual Files from the Distribution Disk

You can use PKUNZIP directly to decompress any file you require. At the DOS prompt, type **PKUNZIP** *zipfile filename* where *zipfile* is the name of the collection of compressed files (default extension ZIP) and *filename* is the name of the individual file to be extracted.

You can also obtain a list of all the files in the collection by typing **PKUNZIP -V** *zipfile*

Example:
You want to extract another driver file after you have completed installation. This lists the files in DRIVERS.ZIP, then extracts the DEC LAT driver.

```
pkunzip -v a:drivers
pkunzip a:drivers zslat.drv
```

Changing Your Loadable Drivers

You can at any time make additional drivers available to ZSTEM, either by performing a partial installation or by directly copying the additional device drivers to the appropriate directory.

Partial Installation

To perform a partial installation, you should start the installation procedure as outlined in the "Starting Installation" section. When prompted for "Target Directory," supply the path name of the directory where your working ZSTEM program resides.

You will then see the screen shown in figure 2.2. At the prompt:

```
Discard existing ZSTEM 320 (Y/N)?
```

Type **N**. You can then make a new selection of device drivers. You can also change some of the ZSTEM defaults.

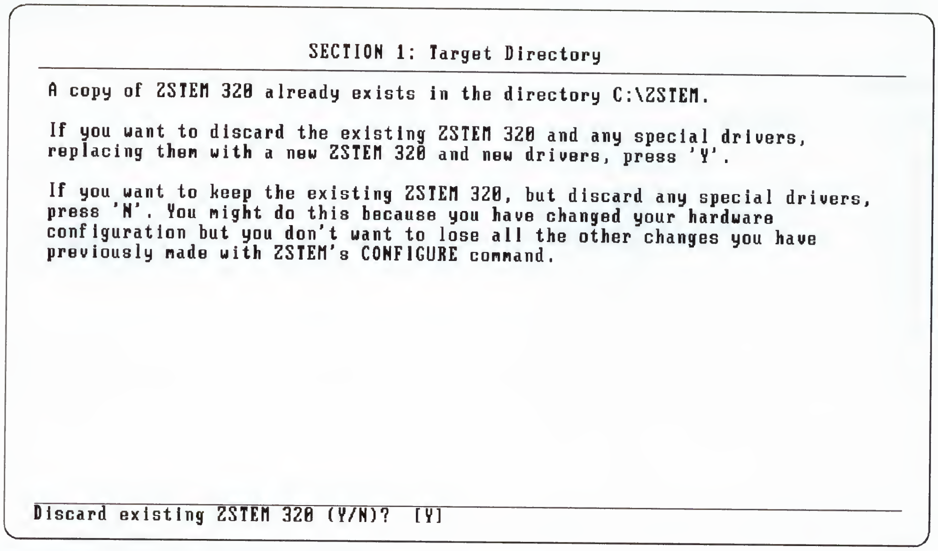


Figure 2.2 Installation procedure "Target Directory" screen

Copying Drivers

This alternative method of making loadable device drivers available to ZSTEM should only be attempted by knowledgeable users.

ZSTEM device drivers are contained in special files having a filename extension of ".DRV". To make a driver available to your working ZSTEM program, you only need to decompress the driver from the DRIVERS.ZIP, and copy it to a directory where ZSTEM will find it on starting. However, if ZSTEM fills its device driver slots before reading all the available .DRV files, it ignores the remaining drivers! ZSTEM searches for driver files in the following order:

- first, in the current directory;
- then in the directory where the ZSTEM program resides; (not possible with MS-DOS Version 2.0)
- then in the directory given in the environment variable "zstem". You can define this variable by including a line in your AUTOEXEC.BAT file:
  SET ZSTEM=*directory*

Listing Drivers

The program ZDRIVER.COM, included on your ZSTEM diskette, lists the headers of driver files. Output from ZDRIVER can be redirected.

If you execute ZDRIVER from the same directory as ZSTEM, it will search the same path that ZSTEM would, finding all available driver files and listing their headers. At the DOS prompt, type **ZDRIVER** and press ENTER.

You can alternatively specify a directory (or a list of files) to be listed. At the DOS prompt, type **ZDRIVER** *filelist* where *filelist* is any combination of paths and filename patterns.

Installing

Changing Your Defaults

At any later time, you can change the ZSTEM program defaults in your version by changing the relevant items on ZSTEM's configuration screens. You must remember to SAVE your ZSTEM configuration if you want your new configuration to be retained the next time you run ZSTEM. See the section "Saving Your Options" in Chapter 3 for more details.

Chapter

3

Using ZSTEM

Using ZSTEM

Introduction

This chapter describes how you start the ZSTEM terminal emulator program, how you give it commands, and how you change its operating parameters (configuration).

The first section tells you how to run your newly-installed ZSTEM. In most cases the default operating parameters and the ones you selected during installation let you log-in to your host right away.

The next sections tell you about the general syntax of ZSTEM commands, and the EXIT command in particular. At the end of this chapter, there is a summary list of all the commands.

The CONFIGURE command is the most extensive ZSTEM command; it performs the same functions as Set-Up on a real VT terminal. A section of this chapter tells you how to use the CONFIGURE command to change the operating parameters. You will find specific information about the actual parameters within other chapters.

Some operating parameters are controlled by switches which you include on the command line when you run the ZSTEM program. These are described in the section "Command Line Switches."

If you make any changes in the operating parameters, you will probably want to save the current program so that you do not have to make the same changes again. Two sections "Saving Your Options" and "Starting ZSTEM with Your Saved Options" describe the ways you can save the options you selected, and apply them when you run ZSTEM at another time.

Starting ZSTEM

You can start ZSTEM before you have connected with a host. Ensure that the ZSTEM program you have just installed is available. That is:

- If you are using MS-DOS Version 3.0 or later, your ZSTEM program can be in a directory on your search path.
- Or, if you are using an earlier version of MS-DOS, the current directory must contain your installed ZSTEM program.
- Or, if you have installed ZSTEM on a diskette, insert the diskette in the drive.

To start up ZSTEM:

■ At the DOS prompt, type: **ZSTEM320** and press RETURN. You will see the initial ZSTEM 320 screen and a cursor.

If your installed defaults match your PC hardware and the requirements of the host, you can probably connect with the host right now, without reading much further.

To the host, your PC appears to be a VT terminal. Until you connect with the host, characters you type are not echoed on the screen.

In many environments, pressing RETURN several times will get the host's attention and you will see the host prompt. If you are using a modem, pressing A, T, RETURN will generally get the modem's "OK" answer.

If your host has requirements different from ZSTEM's default configuration, you can go into ZSTEM command mode and make the necessary changes on the various configuration screens. For example, if you need to change the baud rate on the COM port you specified during the install procedure, you can do this by pressing ALT+Z to go into command mode and obtain the "ZSTEM?" prompt. Then press C, RETURN, S, RETURN to access the Session Configuration screen. Press DOWN ARROW to highlight the item **Baud rate** on this screen; then press SPACE to select the correct rate. Press RETURN three times to leave command mode.

The remainder of this chapter contains general information about ZSTEM's command mode, commands, and the CONFIGURE command. The CONFIGURE command is equivalent to Set-Up on a real VT terminal.

Figure 3.1. Initial ZSTEM 320 screen

To exit from ZSTEM, press ALT+Z to obtain the "ZSTEM?" prompt. Then press E, RETURN.

Commands

When ZSTEM is running on your PC, your PC normally acts as a VT terminal. That is, what you type is sent to the host, and what you see on your display is put there by the host. When you want to talk to ZSTEM itself, you must put the ZSTEM program into command mode and give ZSTEM a command. There are commands to change the configuration, program softkeys, initiate file transfers, and access other features of the emulator.

Terminal Mode and Command Mode

ZSTEM has two distinct modes: terminal mode and command mode.

In terminal mode, your PC acts as a terminal. This is the normal state.

You can go into command mode by pressing the combination ALT+Z. The "ZSTEM?" prompt appears on the bottom line. At this prompt you can give any of the ZSTEM commands, including the important CONFIGURE command. Most commands ask for further input. To leave command mode, press RETURN at the "ZSTEM?" prompt. The screen is restored; ZSTEM goes back to terminal mode.

Some keyboard layouts have a SETUP key. This key has the same function as ALT+Z. Throughout this manual, ALT+Z is used to enter command mode; but you can always use SETUP instead.

The on-line HELP screen may be displayed whenever you go into command mode. Whether or not the HELP screen is displayed depends on the value of item **Automatic command mode menu** on the General Configuration screen.

Short Form of Command Names

To invoke a command, you can type its entire name. You can also shorten it; the minimum is shown by the upper-case letters in the list of commands on the on-line HELP screen. The HELP screen is shown in the next section of this chapter. For example, at the "ZSTEM?" prompt, you can invoke the CONFIGURE command by pressing only C and RETURN.

However, to invoke the SAVE command, you must type at least **SA** to distinguish it from the SHELL, SOFTKEY, STARTUP and SWITCH commands. In the descriptions and examples in this manual, the full command name is often used. But you can always shorten the name.

Using ZSTEM

Entering Command Data

After you give a ZSTEM command, most commands ask for further input. The bell will sound if you press invalid keys, or if the buffer is full. The following describes the format of data entry for most ZSTEM commands.

`?`	If a prompt ends with a question mark, type your response and then press RETURN. Your response might be a path name.
`(      )?`	If a prompt ends with a default value and a question mark, you can type your response and then press RETURN, or only RETURN for the default.
`:`	If a prompt ends with a colon, type one character and then RETURN.
`(      ):`	If a prompt ends with a default value and a colon, type a single character and then press RETURN, or only RETURN for the default.
`...`	If a prompt ends with three dots, press a single key only.
`Select Item?` `Enter Value?`	These special prompts are described in the "CONFIGURE Command" section in this chapter.

Using ZSTEM

Command Type-Ahead

In the examples in this manual, a command name is usually followed by RETURN. If there are subsequent prompts and arguments, these too are followed by RETURN.

However, there is another shorter way of entering the same command and arguments. If you know what your answers to the additional prompts will be, you can type on the same line both the command and your answers (arguments), without waiting for the prompts. This convenient feature is called command type-ahead.

Just separate the command and each argument with the SPACE bar. If the argument itself has imbedded spaces, and the argument does not extend to the end of the line, enclose the argument in quotes.

You can also put several ZSTEM commands on the same line. As explained in a preceding section, you can use the short form of command names.

This method cannot be used with arguments which would normally follow a prompt ending with three dots.

Examples:

Invoke the BAUD command to change the communication port baud rate:

```
ZSTEM? baud 9600
```

Invoke the DOS FIND command. The argument of RUN, although it contains spaces, extends to the end of the line.

```
ZSTEM? run find "INC" c:\prog.asm
```

Invoke the DOS DIR command, and then invoke XMODEM. Because the argument of RUN does not extend to the end of the line, it is in quotes.

```
ZSTEM? run "dir c:" xmodem
```

Recalling and Editing Commands

ZSTEM has a convenient command recall capability. To recall previous commands and make them the current command, press UP ARROW and DOWN ARROW ZSTEM has a 512 byte buffer in which it keeps commands which are three or more characters long.

You can edit the current ZSTEM command by moving the cursor, and deleting or inserting text as required. Table 3.1 tells you which VT keys to use. Most PC keyboards map these VT keys onto the indicated PC keys; the exact mapping for various keyboards is given in Chapter 7.

Table 3.1
Command Editing Functions

VT function	Usual PC key	Command Editing Function
LEFT ARROW	LEFT ARROW	Move the cursor left.
RIGHT ARROW	RIGHT ARROW	Move the cursor right.
INSERT HERE	INS	Toggle insert/replace mode; the cursor type also changes.
BACKSPACE	BACKSPACE	Delete the character to the left of the cursor.
REMOVE	DEL	Delete the character at the cursor.
FIND	HOME	Move the cursor to the beginning of the line.
SELECT	END	Move the cursor to the end of the line.
ESC	ESC	Erase the line.
HELP	CTRL+F5	Enter HELP mode.
TAB	TAB	Enter HELP mode, and display help about the string on command line.

On-Line HELP

ZSTEM has an on-line HELP facility. The HELP screen appears as a list of all the ZSTEM commands and a set of overlaid windows which present information about any command you select from the list. In addition, the current state of command line switches is available in one of these windows.

```
ZSTEM 320 Smart Terminal Emulator, Version (V1.0)
Copyright (C) KEA Systems Ltd 1991
Licensed for use on a single system.

 System      Transfer     Options      Softkeys     Sessions     Other
 HELP        DIsk         Configure    SOftkey      CReate       WIndow
 Exit        Kermit       !Configure   GET          Next         PRinter
 SAve        Xmodem       Baud         SAve         SWitch       RRL
 GET         Ymodem       VIDeo        TYPe         DIRectory
 Run         TABle        COM3         WAItime      HAngup
 SHell       TRAnslate    COM4                      OPen
 CWD                      ANSwerback                DEStroy
 HOtkey                   PRImary                   PHone        Special
 MEMory                   SECondary                 LOcal        switches
 STartup                                            LINedrop     command line

  Welcome to ZSTEM Help.  Help keys:
   Tab/BackTab  search help menu for an item matching typed input
   Help         displays help on using help (this message)
   arrows       move directly to an entry in the help menu
   Paging keys  move within a multi-page help message
   Esc          exits help and displays command line help
   CR           exits help and copies highlighted command to command line
                                                                 PageDown
ZSTEM?
```

Figure 3.2   HELP Screen

Entering HELP Mode

By default, the HELP screen is displayed whenever the "ZSTEM?" prompt appears (whenever you go into command mode.) Even though the terminal mode screen is restored when you leave command mode, you may not want the terminal mode screen disturbed. If you set the item **Automatic command mode menu** on the

General Configuration screen to **N**, the emulation screen will not be disturbed when you go into command mode. Then you can still use one of the following ways to display the HELP screen.

You can display the HELP screen by pressing the HELP key, or by typing **HELP** (or only **HE**) at the "ZSTEM?" prompt.

Or you can display the HELP screen by pressing the TAB key at the "ZSTEM?" prompt. This method has an advantage: if you have already typed a command or part of a command, ZSTEM will highlight the first command on the HELP list which matches your input, and present information about that command in the window. This is the fastest way to get help on a particular command.

Getting Help About Any Command

To move through the list of commands in order, press TAB or SHIFT+TAB. If you have already typed a command or part of a command, only the commands which match your input will be selected. To move about the list and browse without regard for previous input, press the ARROW keys.

The information about some commands does not fit in a single window. You will be invited to press NEXT SCRN and PREV SCRN (or PG DN and PG UP) to view all the information.

Leaving HELP Mode

To leave HELP mode, press ESC. This leaves the command line the way it was. You could then type a ZSTEM command, or press RETURN to leave command mode and go back to terminal mode.

Or you can press RETURN to leave HELP mode; this puts the selected command on the command line, replacing any previous command. You can add more characters and edit the line, before pressing RETURN again.

Or you can simply type any text; this gets you out of HELP mode, adding the text to the existing command line.

If you wish to program additional "help" functions for yourself or other users in your environment, refer to "Local Help" in chapter 14.

EXIT Command

There is a special command to terminate ZSTEM and return to the operating system:

- Press ALT+Z to go into command mode. ZSTEM responds with:

  ```
  ZSTEM?
  ```

- Type **EXIT** and press RETURN. You can shorten this to **E**. ZSTEM terminates and the operating system prompt is displayed.

You can configure ZSTEM so that when it is terminated, the ports either remain connected or are restored to the state they had when ZSTEM was invoked. This is controlled by the item **Restore port** on the Session Configuration screen.

Ports remain connected

If **Restore port** is set to **Never**, the Data Terminal Ready (DTR) line on your communication port will be left TRUE. Only the interrupt vector will be restored and interrupts will be disabled. This allows you to exit ZSTEM, leaving the communication line connected. When you run ZSTEM again, you can continue the session without having to log on again.

Ports are restored

If **Restore port** is set to **Exit** or **Exit+DOS call**, each port will be restored to the state that existed before you invoked ZSTEM. A modem may remain connected, or it may be disconnected; this depends on the state of the DTR control line when ZSTEM was started. Refer to the section "Ending a Session" in Chapter 4, "Communications."

CONFIGURE Command

CONFIGURE is the most used ZSTEM command. With this command, you can interactively change ZSTEM operating parameters for communications, display, keyboard, printers, and file transfer. It is similar to the set-up function of a real VT terminal. You can use the CONFIGURE command at any time, you do not need to log off or disconnect from your host.

The CONFIGURE command gives you access to a series of configuration screens. Each screen contains several items which take on different values. The individual items are not described in this chapter; they are described in context throughout the manual. There is also a summary of items, organized by configuration screen, in appendix A.

In addition to invoking the CONFIGURE command interactively, you can also program a CONFIGURE command within a softkey. This can be very convenient if you often make the same configuration changes. Some examples appear in chapter 11, "Using Softkeys."

Selecting a Configuration Screen

To access any configuration screen:

- Press ALT+Z to go into ZSTEM command mode.
- At the "ZSTEM?" prompt, type **CONFIGURE** and press RETURN. You can shorten this to **C**. The General Configuration screen (or the configuration screen you accessed most recently) will be displayed. At the bottom of the screen, the following prompt is displayed:

```
Select item?
```

- If the screen displayed is not the one you want, determine the single-letter access code for the screen you want. These codes appear in the lower right corner of your display, and also in table 3.2. Type that letter, and press RETURN. That screen will be displayed.

  Or, you can press the ARROW keys to select the name of the screen you want in the lower right corner of your display, and then press SPACE.

Table 3.2
Configuration Screens and their Single-letter Access Codes

G	General Configuration
S	Session Configuration
P	Text Printer Configuration
D	Display Configuration
B	Keyboard Configuration
C	Color Palette Configuration
F	Color Mapping Configuration
A	ASCII File Transfer Configuration
K	Kermit Configuration
X	X/Ymodem Configuration

Selecting a Configuration Item

To select an item from the displayed configuration screen:

- At the "Select item?" prompt, type the two-digit number which identifies the item you want, and press RETURN.

  or

  Press the ARROW keys to highlight the item you want.

  or

  Press the TAB key to step forward through the screen items until the item you want is highlighted. SHIFT+TAB steps in reverse.

- At the bottom of the screen, the following prompt is displayed:

  ```
  Enter value?
  ```

  Now you can change the value of this item, as described in the following section.

You can leave the CONFIGURE command at any time. If you press RETURN at each prompt you will go back to terminal mode as follows:

`Enter value?` RETURN

`Select item?` RETURN

`ZSTEM?` RETURN

Changing the Value of a Configuration Item

When you select a configuration item, the item is highlighted, and the prompt "Enter value?" appears at the bottom of the screen.

Values can be entered in several different ways. A line at the bottom of the screen indicates the format you should use for the currently selected item. Table 3.3 summarizes the different formats. If you press ESC at any time, you will go back to the "Select item?" prompt; the item retains its previous value.

To complete the input of your new value, press RETURN or move to a new item by pressing TAB or the ARROW keys. If you press RETURN without entering a new value, the item retains its previous value.

As soon as you enter the new value, it takes effect and will remain in effect until you exit from ZSTEM. If you wish to save this configuration for the future, you must use the SAVE command before you exit. Refer to "Saving Your Options" in this chapter.

Using ZSTEM

CONFIGURE Command Type-Ahead

The CONFIGURE command, like other ZSTEM commands, accepts input in the command type-ahead format. You can type on the same line both the CONFIGURE command and its arguments, without waiting for the individual prompts. Just separate the command and each argument with SPACE.

Some configuration screen items require you to press SPACE to select a value. You can enclose the selecting SPACE presses in quotes.

Examples

Set **Transparent mode** on the Display Configuration screen:

```
ZSTEM? configure d 16 y
```

Set **Terminal mode** to **VT100** on the General Configuration screen. There are exactly three SPACE characters between the quotes:

```
ZSTEM? c g 10 "   "
```

TABLE 3.3
Prompts Which Accompany "Enter value?"

`SPACE or BACKSPACE to select`	All the possible values appear on the screen, with the current value highlighted. Pressing the SPACE bar the first time selects the first value in the list. Each following SPACE selects the next value. BACKSPACE selects the previous value.
`SPACE to select or type value`	Only one of a list of values appears on the screen. Pressing the SPACE bar the first time displays the first value from this list. Each following SPACE displays the next value from the list. BACKSPACE selects the previous value. Or you can directly type the value using BACKSPACE to correct errors.
`Y, N or SPACE`	Press Y for yes, N for no, or SPACE to toggle.
`number`	Type a string of numeric digits from 0 to 9.
`path name or NUL`	Type a complete path name, or a network name or address. If you don't want a file, type **NUL**.
`string`	Type a character string.
`char`	Type a single printable character.
`char, hex digits, or name`	Identify an ASCII character in any of the following ways: · Press the key that generates the character. · Type the ASCII value of the character: two hex digits in the range of 00 to 7F. · Type the standard ASCII control character name with or without angle brackets. For example, the null character is **<NUL>** or **NUL**.
`char, hex digits, name, or ON/OFF`	Enter a value as described in the above format, or type **ON** or **OFF**.
`char or ON/OFF`	Type a single printable character, or type **ON** or **OFF**.

Using ZSTEM

Command Line Switches

There are some options which can be changed only at the time you invoke ZSTEM. These options are called command line switches. Use the switch character / or - to include switches on the DOS command line following the program name. If you include more than one switch, separate them with a space. For example, you could include two switches as: **ZSTEM320 /I:02 /R**

If you invoke ZSTEM using command line switches, and then save the entire program image using the SAVE command, the effect of the switches you specified are also saved (with the exception of the A switch). You no longer need to specify the switches when you run your SAVEd program. The switches currently in effect are shown on one of the on-line HELP screens.

A complete list of command line switches is given here. If there is a switch that undoes a previously saved switch, it is also described. All switches are described more fully in context throughout the manual.

? Display information about all the command line switches. ZSTEM does not run.

A Make all program overlays resident. You then don't have to keep the program file available on disk at all times. This is particularly useful if you are running ZSTEM from diskette. The effect of this switch is not saved.

B Z The B switch uses BIOS keyboard handling, rather than ZSTEM's normal keyboard handling. BIOS handling provides keyboard compatibility with RAM resident programs. This can be canceled in a saved program with the Z switch. For further details, refer to Chapter 13, "Operating System Environment."

C:*configuration*

Use the named configuration file. Further details are in this chapter in the section "Starting ZSTEM with Your Saved Options."

D:*adapter*	Use the named video adapter. This is handy if the configured value of **Display Adapter** on the Display Configuration screen does not match your display hardware. This switch is also saved when you SAVE a configuration. For further details, refer to Chapter 6, "Display."
I:*nn*	Execute one of 36 softkeys on startup. If you save a program with this switch set, you can cancel it with I (no argument). For further details, refer to Chapter 11, "Softkeys."
L:*nn*	Display more than 24 lines of text on VGA or EGA. For further details, refer to Chapter 6, "Display."
N U	The N switch forces the keypad into numeric mode. This will ensure that the shift/plain sense of the keypad agrees with the keyboard diagrams in Chapter 7. If your keyboard has separate arrow keys (PowerStation, IBM Enhanced, or LK250 keyboards) do not use this switch. You can cancel this switch in a saved program with U. For further details, refer to Chapter 7, "Keyboard."
R H	The R switch shows the bold attribute as reverse video on those displays which show bold poorly, and shows ZSTEM command highlights as reverse video (instead of bold) on all display types. The H switch cancels this in a saved program. For further details, refer to Chapter 6, "Display."
S F	The S switch scrolls the display using software, not using the video adapter hardware. This switch is also saved when you SAVE a configuration. The F switch cancels software scrolling in a saved configuration or program. For further details, refer to Chapter 6, "Display."

Using ZSTEM

Saving Your Options

After you have configured the loaded ZSTEM program to your liking, you will want to save this version for future use. With the SAVE command you can save the configuration. Or you can save an image of the entire program. However, this method uses more disk space; especially when you want to keep several configurations.

The SAVE command can also be used to save only the current softkey programs. See Chapter 11 for more details.

Saving the Configuration

You can save the current configuration values, multiple sessions, and softkey programs in a named configuration file. You can have any number of configuration files, named as you choose. To save the current configuration:

- At the "ZSTEM?" prompt, type **SAVE** and press RETURN. You can shorten this to **SA**.
- At the prompt:

  ```
  Program, Softkeys, or Configuration (C):
  ```

  press C and RETURN.
- At the prompt:

  ```
  Configuration file name (.cfg)? zstem320.cfg
  ```

  Press RETURN for the default filename ZSTEM320.CFG, or change the default name to be the configuration file you want to create, and press RETURN. If you do not specify a directory, it defaults to the current directory. If you later invoke ZSTEM with no C command line switch, it looks for the default configuration file named ZSTEM320.CFG.

You could shorten the above steps to: **SA C** *filename* RETURN.

Saving a Complete Image of ZSTEM

You can also save your configuration by saving the entire executable ZSTEM program as a new file on disk. This method uses more disk space than saving only the configuration, especially when you need to save several different configurations. You supply a new program name. The new file has the current configuration values, multiple sessions, command line switches, and softkey programs. The ZSTEM program that you are now running must still be available on disk. That is, if you ran ZSTEM from a diskette, that same diskette must be mounted in the same drive. This is because ZSTEM must read the program file and combine it with the program in memory to make a new program file.

To save a complete image of ZSTEM:

- At the "ZSTEM?" prompt, type **SAVE** and press RETURN. You can shorten this to **SA**.
- At the prompt:

  ```
  Program, Softkeys, or Configuration (C):
  ```

  press P and RETURN.
- At the prompt:

  ```
  Save file name (.exe)?
  ```

  type the path name of the new executable file you want to create. To avoid overwriting the installed program, do not use the name ZSTEM320; specify a different name. If you do not specify an extension, it defaults to .EXE; this lets you later run your new ZSTEM by simply typing its name at the operating system prompt. If you do not specify a directory, it defaults to the current directory.

NOTE: If you have MS-DOS Version 2, do not change the name of this executable file with a DOS RENAME or COPY. Instead, if you want to change its name, use the SAVE command to save it again, giving it a different name.

Starting ZSTEM with Your Saved Options

This section shows you how to run ZSTEM with your saved configuration. After you have saved a configuration, when you run ZSTEM no further setting-up is necessary. Just log in and the host is right there!

Starting ZSTEM with a Saved Configuration

If you saved a configuration by creating a named configuration file as described in a preceding section, you could now start ZSTEM with that configuration file as follows:

■ At the operating system prompt, type: **ZSTEM320 /C:***confile* where *confile* is the name of the configuration file. ZSTEM starts with the saved configuration values, multiple sessions, and softkey programs. *Confile* can be a complete path, or filename only. The default extension is .CFG. If you supply a filename only, ZSTEM searches for the configuration file:

- first, in the current directory;
- then in the directory where the ZSTEM program resides;
- then in the directory given in the environment variable zstem. You can define this variable by including the following line in your AUTOEXEC.BAT file:

  `SET zstem=`*directory*

If you do not use the C command line switch, ZSTEM looks for a default configuration file named ZSTEM320.CFG. It searches for the default configuration file in the same directories it searches for the named configuration files.

If ZSTEM does not find a configuration file, it starts with the configuration and softkeys contained in the executable file. If you want ZSTEM to ignore all configuration files, include the C switch with no following filename.

The name of the configuration file which ZSTEM is using (or tried to find) is always shown in item **Config file** on the General Configuration screen.

Applying a Saved Configuration after ZSTEM has been Started

You can use your saved configuration file in another way. When ZSTEM is running, you could use the configuration file to change the current configuration as follows:

- At the "ZSTEM?" prompt, type **GET** and press RETURN.
- At the prompt:

  ```
  Config/Softkey file name (.key)?
  ```

  type the name and extension of the configuration file, and press RETURN.
- At the prompt:

  ```
  Merge or Replace (R):
  ```

  press RETURN. This last prompt only concerns the softkey programs which might be included in your configuration file. For details of this option, refer to the section "Saving and Loading your Softkey Programs" in Chapter 11.

Starting a Complete ZSTEM Image You Have Saved

You may have saved a configuration by saving the entire executable ZSTEM program as described in a preceding section. The program has the same configuration values, command line switches, multiple sessions, and softkey programs. You could now start it, like any other program, by typing its name at the operating system prompt. The program name will be whatever name you gave to your saved ZSTEM image. Remember that unless you use the C command line switch, ZSTEM always looks for the configuration file ZSTEM320.CFG. If you are starting a complete image, you probably do not want ZSTEM to find any additional configuration file; you could move or rename ZSTEM320.CFG so that your ZSTEM image will not find it or use the C command line switch without a configuration filename.

Examples of Starting ZSTEM with Saved Options

The following saves a configuration file as A:\ZSTEM\MARCIA.CFG:

```
ZSTEM? save
Program, Softkeys, or Configuration (C):
Configuration file name (.cfg)? a:\zstem\marcia
ZSTEM?
```

The following shows how you can start ZSTEM with this saved configuration file:

```
C:\> zstem320 /c:a:\zstem\marcia
```

The following saves a complete program image in the file C:\ZSTEM\MYZSTEM.EXE:

```
ZSTEM? save
Program, Softkeys, or Configuration (C): p
Save file name (.exe)? c:\zstem\myzstem
ZSTEM?
```

Assuming that the directory C:\ZSTEM is on your search path, you can run this saved program image by typing at the DOS prompt: **MYZSTEM**.

List of ZSTEM Commands

The following is a complete list of ZSTEM commands and a brief description of each. The index at the back of this manual contains page references under individual command names.

ANSWERBACK	Defines the answerback character sequence sent in response to the received inquiry request (Ctrl-E) from the remote port.
BAUD	Sets the communication port baud rate.
COM3 or COM4	Changes the device address and interrupt level for the named port.
CONFIGURE	Displays configuration screens and sets ZSTEM operating parameters.
!CONFIGURE	A variation on the CONFIGURE command in which the screens are not shown.
CREATE	Creates a new session.
CWD	Changes the current directory to the one specified.
DESTROY	Closes an existing session.
DIRECTORY	Provides a general service directory for the current session.
DISK	Captures incoming data to a disk file, or transfers a local disk file to the remote system.
EXIT	Terminates ZSTEM and returns to the operating system prompt.
GET	Loads a new configuration or set of softkey definitions into the resident ZSTEM.
HANGUP	Disconnects a modem (and some networks) from the host.
HELP	Displays help about the ZSTEM commands and the command line switches.
HOTKEY	Prepares to send a Hotkey command to a resident Hotkey program.
KERMIT	Performs file transfer between your computer and the remote system using the Kermit Protocol.

LINEDROP	Programs a softkey which will be executed if the connection to the remote system is lost.
LOCAL	Enables or disables local mode.
MEMORY	Displays memory in use.
NEXT	Changes to the next session.
OPEN	Opens the current session.
PHONE	Maintains a telephone directory and places calls using an autodial modem.
PRIMARY	Changes the standard Primary Device Attribute Report.
PRINTER	Directly enables or disables output to the printer destination.
RRL	Displays the Restricted Rights Legend.
RUN	Invokes another program with an automatic return to ZSTEM upon completion.
SAVE	Saves to disk either the configuration, or the softkey definitions, or the complete ZSTEM program.
SECONDARY	Changes the standard Secondary Device Attribute Report.
SHELL	Temporarily enters the operating system until an EXIT command is given.
SOFTKEY	Programs or deletes a softkey.
STARTUP	Programs the softkey which is invoked when ZSTEM is started.
SWITCH	Changes to a specified session.
TABLE	Dump or Load a character translation table.
TRANSLATE	Translate a text file between the local and host character sets.
TYPE	Displays and optionally prints all currently programmed softkeys.
VIDEO	Suppresses all further display in emulation mode.
WAITIME	Changes the default timing values used during softkey execution.
WINDOW	Scrolls a window backwards to view previously displayed text.
XMODEM	Performs file transfer between your computer and the remote system using the Xmodem Protocol.
YMODEM	Performs file transfer between your computer and the remote system using the Ymodem Protocol.

Chapter

4

Communications

Communication

Introduction

This chapter discusses the various ways you can use your ZSTEM program to connect to a host.

It describes the concept of a session, and how you can have several sessions with one or more hosts at the same time.

You can connect your PC to a host via a regular serial (COM) port and a modem. Or if you are close to the host, you can connect your COM port directly to the host. Or you may choose to connect using one of the many networks that ZSTEM supports.

This chapter refers to many configuration items; most of these are on the Session Configuration screen. To access this screen, at the "ZSTEM?" prompt, press C, SPACE, S, and RETURN. This command obtains the screen which describes the current session. If you have more than one session, there will be a Session Configuration screen for each session; see the section "Multiple Sessions."

Communication

Starting a Session

What is a session? In this manual, the term session refers to a connection via a port to a host. It could be a serial (COM) port or a network port. When you are not in command mode, your PC emulates a terminal connected to the host through this port. In this session, you can access the host, and log-on, or connect in whatever way the host expects.

You can make additional sessions with the ZSTEM CREATE command. You don't have to create session 1, it is automatically created for you when ZSTEM starts. Up to four sessions can exist simultaneously, although you can communicate with only one session, the current session, at a time. You can CREATE a new session, switch between sessions with the SWITCH and NEXT commands, and remove a session with the DESTROY command. See "Multiple Sessions" in this chapter for more information.

The items on the Session Configuration screen apply to the current session only. If you have multiple sessions, you will have a corresponding number of Session Configuration screens. The first item on each screen, **Session 1 name**, **Session 2 name**, etc. identifies the session number. The default value of **Session 1 name** is **FirstSession**.

You can establish a session via a serial (COM) port or a network port. Depending on which type of port you are using, you should read one of the following sections, "Serial Ports and Modems" or "Networks." Then you can start talking to the host.

Serial Ports and Modems

You should read this section if you are communicating with your host via a serial port, either directly or through a modem.

The Session Configuration screen must specify the parameters of your serial port. The values on this screen override any port parameters which have been previously set by the DOS command "MODE." The following sections describe these parameters.

If you are not sure of the parameters that your host requires for your "terminal," use the ZSTEM default parameters. If those are not suitable, you must contact your host system administrator for specific communications parameters.

Port

In the item **Port** press SPACE to select **Com1** or **Com2**. If you have an IBM PS/2 system with a multiport I/O board installed, you can select the additional value **Com3**. If you have installed additional ports on your machine, you must assign a device address and interrupt level before you can select them. Refer to "Additional Ports" at the end of this section.

If you chose Zenith Data Systems' special 404 board when you installed ZSTEM, the value **Z404** also appears among the choices for the item **Port**. This board operates up to 19200 baud. The board must be installed at address 270 and interrupt level 3.

Baud Rate

The baud rate of your serial port must be the same as that used by the host. ZSTEM operates at the common baud rates listed below. The default value is **9600** baud. The higher rates only work on faster machines and may also depend on cabling.

110	**150**	**300**	**600**	**1200**	**2400**	**3600**
4800	**7200**	**9600**	**19200**	**38400**	**57600**	**115200**

In the item **Baud rate** press SPACE to select one of these values, or type the value and press RETURN.

There is another, equivalent way you can show and set the baud rate. Because this method does not use the configuration screens, you may find it more convenient for quick changes. To show and set the baud rate of the current session's serial port,

- At the "ZSTEM?" prompt, type **BAUD** and press RETURN. You can shorten this to **B**.
- The following is displayed:

  `New baud rate (`*`baud`*`)?`

  where *baud* is the current baud rate for this session.
- To retain the current baud rate, press RETURN.

  or

  To change the baud rate, type one of the above baud rates and press RETURN.

ZSTEM only sets the baud rate of your PC port. It may be necessary to set the baud rate of your modem separately. Many modems, including the Hayes modems, have automatic rate selection. When you send the "AT" code to the modem, it adjusts its own baud rate to match the baud rate of your PC port.

In this manual, the term "baud" is used to mean "bits per second."

Bits: Data, Stop, Parity

The item **Data bits** controls the number of data bits in a data word. The value should be **7** or **8**. This does not include stop bits or parity bits. You will require a value of **8** in this item if you are receiving 8-bit codes (those from the C1 and GR code tables). ZSTEM will automatically switch to 8 bits, no parity when Xmodem is started and return to the previous values when Xmodem finishes. If the **Parity** item is set to **None**, then **Data bits** is likely to be **8**; otherwise **Data bits** is likely to be **7**.

In the item **Stop bits**, press **1** or **2** to select the number of stop bits sent with each data word. Most systems use just one stop bit. However, using two stop bits may compensate for slight differences in baud rate between systems. This is especially true for high baud rates.

In the item **Parity**, press SPACE to select parity checking and generation. The values are: **None**, **Even**, **Odd**, **Mark**, **Space**, **Even(No check)**, and **Odd(No check)**. Incoming parity is only checked in the **Even**, **Odd**, **Mark** and **Space** cases. If an incoming parity error is detected, ZSTEM displays a reverse question-mark in place of the character in error. Outgoing parity is generated in all cases except **None**.

The most common values for DEC hosts are 8 data bits, 1 stop bit and no parity.

Flow Control

Flow control is a means of preventing loss of data by stopping the receive and send buffers from becoming full.

In the item **Receive Xoff point** you can change the point at which the receive buffer is considered "full." By default, this item is set to 0.875 of the buffer size. The "Xon point" is always 0.25 of **Receive Xoff point**.

The item **Protocol** selects how flow control is used during normal communication with the host. Use SPACE to choose one of four values:

None — ZSTEM neither sends nor responds to XON/XOFF commands.

Xon/Xoff — When the receive buffer reaches its threshold, ZSTEM sends XOFF to the host. ZSTEM responds to XON/XOFF commands to flow-control data that it is transmitting. This is the default.

Issue Xon/Xoff — When the receive buffer reaches its threshold, ZSTEM sends XOFF to the host. But ZSTEM does not respond to XON/XOFF commands. This is useful if a host never sends flow control, thus any received "flow control" must be line noise and will be ignored.

Obey Xon/Xoff — ZSTEM does not send XON/XOFF to the host. But ZSTEM responds to XON/XOFF commands to flow-control data that it is transmitting.

The item **Hardware flow** lets you use hardware flow control in those cases where a host or communications equipment requires this method. ZSTEM raises or lowers the selected control line at the same time as it sends XON or XOFF. You can have both **Protocol** and **Hardware flow** enabled at the same time. Unless you are sure that you need hardware flow control, set this item to **None**:

None ZSTEM asserts DTR at all times. This is the default.

DTR/DSR When ZSTEM is ready to receive, it asserts DTR. When the receive buffer reaches its threshold, ZSTEM removes DTR. The communications device must assert DSR for ZSTEM to send. If DSR is removed, ZSTEM stops sending.

RTS/CTS When ZSTEM is ready to receive, it asserts RTS. When the receive buffer reaches its threshold, ZSTEM removes RTS. The communications device must assert CTS for ZSTEM to send. If CTS is removed, ZSTEM stops sending.

A special "display only" item, **Flow control state**, on the Session Configuration screen shows the current flow control state, ready or blocked, for each direction.

Connecting Via a Modem

A modem allows you to connect to a remote host over standard telephone lines. ZSTEM can use any external or internal modem. Connecting to your host via a modem is very similar to connecting directly to your host.

Before dialing, you should determine the port your modem is connected to, and the speed of the line connecting your host and modem. You must then set the correct port and baud rate in ZSTEM using the methods explained above. Most modems will automatically set their speed. You may, however, be required to explicitly set your modem speed.

After setting the correct serial port and baud rate, you can issue modem commands. With a Hayes-compatible modem, the following commands are typical:

`ATDT5551212`
Dials the number 555 1212 on a touch tone line;

`ATDP5551212`
Dials the number 555 1212 on a line that uses pulses.

For best results you may have to issue the following modem commands before dialing:

`ATZ`
Resets your modem;

`ATV1E1`
Sets verbose and echo response on.

Some hosts break the telephone connection automatically at the end of a session. If yours doesn't, you must ensure that your modem disconnects. This will avoid any

unnecessary telephone charges. If your modem recognizes DTR, you can use the ZSTEM HANGUP command to disconnect. Or, you can pause for 2 seconds, type **+++** to get your modem's attention and type **ATH** and press RETURN to hang up the line. (Another way to hang up is to unplug your modem jack.)

PHONE is a powerful command that can be used to: maintain a telephone directory, define the command sequences necessary to autodial numbers, and dial your modem. Refer to Chapter 12, "Phone Directory."

A special "display only" item, **Modem signals**, on the Session Configuration screen shows the modem control signals which are currently active (asserted). These include DSR, DCD, RI, DTR, CTS and RTS. This item is helpful if your modem is internal and has no status indicators.

Additional Ports

If your system has serial ports COM3 and COM4, you must assign a device address and interrupt level for these ports. This is not necessary if your PS/2 system has a COM3 at the standard address.

To specify the address and interrupt level of a COM3 or COM4:

- At the "ZSTEM?" prompt, type **COM3** or **COM4** and press RETURN.
- The following prompt will be displayed:

  ```
  Port address, enter 0 to delete (addr)?
  ```

  where *addr* is the current address. The first time you give this command, *addr* is 3E8 for COM3, 2E8 for COM4. Press RETURN to accept *addr*, or type the correct address and press RETURN.
- The following prompt will be displayed:

  ```
  Interrupt level (int)?
  ```

  where *int* is the current interrupt level. There is no default interrupt level. Press RETURN to retain a previously entered *int*, or type the correct interrupt level 0 to 7 and press RETURN.
- Before you can use your newly-configured serial port, you must save the entire ZSTEM program, and invoke this new ZSTEM program image. Refer to the section "Saving a Complete Image of ZSTEM" in Chapter 3.

Communication

Networks

One of ZSTEM's advanced features is its ability to connect to a host over a network. Connecting over a network gives you the advantage of the network's increased communication speed. ZSTEM contains network drivers that allow ZSTEM to communicate with many different types of network software. At installation time, you must indicate the network software you will use. This makes the appropriate ZSTEM network driver available in the **Port** item when you create your network session.

Among the many types of network software you can use with ZSTEM are KEA Systems' KEAlink LAT and KEAlink TCP. Refer to the "LAT Driver" and "Telnet Driver" sections later in this chapter.

Network Port and Name

ZSTEM supports many networks by means of special external files called ZSTEM loadable drivers. If you made one or more of these loadable drivers available when you installed ZSTEM, these networks will appear among the choices for the item **Port** on the Session Configuration screen.

A special read-only item, **Flow control state**, on the Session Configuration screen shows the current flow control state, ready or blocked, for each direction.

On those networks where ZSTEM performs session control (**Port** set to **CTERM**, **LAT**, **LAT/CTRM**, **NetBIOS**, **BAPI**, or **ZLAN**) an additional read-only item, **Session is connected**, indicates whether or not the session is connected.

Table 4.1 describes the various networks ZSTEM supports. In the item **Port** press SPACE to select the network you wish to use in this session. ZSTEM may require you to enter the item **Name** which holds the external name or address of special network devices. For example, if **Port** is set to **LAT**, **Name** is the service name connected for this session.

TABLE 4.1
Summary of Network Communications Drivers

Network type	Port	Description
3Com/BAPI	**BAPI**	The BAPI extensions to INT 14H were defined for use with the Bridge PCS/1 TCP/IP card, and later supported by other 3Com network products. If you type a service name in **Name**, ZSTEM will attempt to connect via the network to that service. If you type the special name **BAPI_SESSION_MANAGEMENT**, the network software will subsequently invite you to make a connection. The driver is ZSBAPI.DRV.
CTERM	**CTERM**	The driver is ZSLAT.DRV
Datability RAF	**RAF**	The driver is ZSRAF.DRV
FEL Mobius	**Mobius**	With Mobius Edit 92 or later, you can install ZSTEM as the Mobius "cold" replaceable terminal emulator (RTE). With earlier versions of Mobius, you can run ZSTEM as a DOS application and communicate via Mobius to the host VAX. The driver is ZSMOBIUS.DRV
FTP Software TCP/IP	**Telnet/F**	Use only PC/TCP Version 2.03 or later, a TSR version. See "Telnet Driver." The driver is ZSTNFTP.DRV
Any Int 14 including: 3Com EtherTerm Banyan Vines V4.0 Sytek	**I14-Com1**	To use a network which emulates the PC BIOS Int 14 COM support, choose one of the values **I14-Com1**, **I14-Com2**, **I14-Com3**, or **I14-Com4**. Use this driver on a real COM port only if you have a BIOS which supports interrupt-driven receive; else you may lose data at rates above 1200 baud. You cannot send a disconnect signal to this network via an Int-14 connection. The driver is ZSBIOS.DRV
Any Int 6B including: Novell NASI, NACS Ungermann-Bass	**Net1**	Any network software configuration which has a compatible Int 6B interface. The driver is ZSNET1.DRV.
KEAlink TCP	**Telnet/K**	See "Telnet Driver." The driver is ZSTNKEA.DRV

TABLE 4.1 (Continued)

Network type	**Port**	Description
LAT	**LAT**	In the item **Name**, type the service name. See "LAT Driver." The driver is ZSLAT.DRV
LAT or CTERM	**LAT/CTRM**	Attempts a LAT connection first, then a CTERM connection. In most cases, a host available for LAT is also available for CTERM. The read-only item **Session is connected** will indicate which mode is being used. The driver is ZSLAT.DRV
Any NetBIOS including: 3Com 3+ AT&T StarLAN	**NetBIOS**	ZSTEM can use any NetBIOS compatible network card to initiate and answer calls. It sends and receives raw data in NetBIOS packets with no higher level protocol. To initiate calls, choose the value **NetBIOS**. You cannot send break to the host. In **Name**, type the service name or address you want to connect to. To be able to answer calls, choose the value **NetBserv**, and enter the name you want to be known as on the network in the item **Name**. If your network card is configured at the second LAN card address and interrupt level, use the values **NetBIOS2** or **NetB2srv** instead. The driver is ZSNETBIO.DRV
Novell NETware VMS	**I14-Com1**	As "Int14" above. In addition, You must use TES, or Terminal Emulation Services, which is a component of Netware VMS to connect to your host. TES is a resident program; before pressing its "hotkey", you should issue the ZSTEM HOTKEY command. The driver is ZSBIOS.DRV
Novell LAN WorkPlace, Excelan LAN WorkPlace	**Telnet/X**	Version 3.5 or later of Novell's LAN WorkPlace for DOS. This was formerly an Excelan TCP/IP. If you are using version 4 of LAN WorkPlace for DOS, you will have the program CONVERT.EXE, supplied by Novell, which makes applications that use the version 3.5 API work with the version 4 API. You must run this program as part of your network set-up. See "Telnet Driver." The driver is ZSTNXLN.DRV
SUN PC-NFS TCP/IP	**TnPC/NFS**	See "Telnet Driver." If ZSTEM quits and exits to DOS with no error messages, it is probably because PC-NFS is not fully installed. The driver is ZSTNNFS.DRV

TABLE 4.1 (Continued)

Network type	Port	Description
Wollongong TCP/IP	**Telnet/W**	WIN/TCP for DOS version 4.1. See "Telnet Driver." The driver is ZSTNWIN.DRV
Zenith ZLAN	**ZLAN**	ZSTEM can use the Zenith ZLAN network card to initiate and answer calls on the ZLAN Network. No card or network configuration is provided by this driver; all configuration must be done using the standard Zenith methods. To initiate calls, choose the value **ZLAN**; in the item **Name**, type the service name or address in standard NCU format. To be able to answer calls, choose the value **ZLANserv** and enter the name you want to be known as on the network in the item **Name**. If your Zenith network card is configured at the second LAN card address and interrupt level, use the values **ZLAN2** or **ZLAN2srv** instead. This may occur in machines with an EGA card, or with two network cards. The driver is ZSZLAN.DRV

LAT Driver

To use LAT, you need an Ethernet board installed in your PC and Ethernet/LAT software. This software could be KEAlink LAT, DEC LAT, PATHWORKS or any other LAT implementation which conforms with the DEC definition of the LAT API. Consult your network's installation instructions and add to AUTOEXEC.BAT the necessary commands to load and start your LAT network software.

To connect to VAX systems via the LAT protocol, choose the value **LAT** in the item **Port**. In the item **Name**, type the service name. If you do not know which services are available, leave this item blank. When you attempt to go back to terminal mode, ZSTEM will prompt you for the service name. You can press SPACE to see the contents of the LAT Service Name Table. Then type the name of the service you want.

Using LAT in a Task Switching Environment

To use LAT in Windows or other task switching environments, you must install LAT session control blocks (SCB) so they won't be removed. One SCB is required for each simultaneous connection. There are two methods of doing this.

A Copy LATDAT.COM from the ZSTEM distribution disk to your ZSTEM directory. This TSR program contains fixed Session Control Blocks. Add the following line to AUTOEXEC.BAT so that LATDAT runs at start-up:

```
latdat /n
```

For *n*, substitute the maximum number of simultaneous LAT sessions that you want to connect, 1 to 4. The default is 2.

B If your network software is PATHWORKS Version 4, you don't need LATDAT. You can configure PATHWORKS to keep its SCBs internal. Use the LATCP utility provided with PATHWORKS:

```
LATCP define SCB 4
```

This command allocates four SCBs. Up to 10 SCBs can be allocated although ZSTEM supports only four simultaneous connections. As each block takes about 1.5K memory, allocate only as many as you need.

How to Exit from ZSTEM Without Losing a LAT Session

You can maintain LAT sessions even after you exit from ZSTEM. Install fixed SCBs as described in the preceding section. When you are running ZSTEM:

- Open one or more LAT sessions as usual. On ZSTEM's one or more Session Configuration screens set the item **Restore port** to **Never**. The value of **Port** will be **LAT** and **Name** will contain the LAT service name.
- Go into ZSTEM command mode, and save this ZSTEM version. You can save the configuration, or a complete image; see "Saving Your Options" in Chapter 3. If you don't want to restrict your saved version to any specific service name, temporarily change **Name** to * before you save your version; then change **Name** back before you leave command mode.
- Return to ZSTEM terminal mode, and continue your LAT session.

When you eventually exit from ZSTEM, your LAT session(s) will remain connected. You can run other DOS programs. To resume your LAT session, run the version of ZSTEM which you saved.

Other features of LATDAT

You can run LATDAT with switches to access other features.

To display the current state of the sessions, at the DOS prompt type: **LATDAT /Q**

To interactively disconnect any existing sessions, and then unload LATDAT from memory, type: **LATDAT /U**

Telnet Driver

To use Telnet, you need a network board installed in your PC and additional TCP/IP software. This software could be KEAlink TCP, a separate KEA Systems product.

The Telnet driver is used like any other ZSTEM communication driver. Simply make sure you selected the proper Telnet driver when you installed ZSTEM. Then select one of the following values in the item **Port** on the Session Configuration screen.

select...	**for network product...**
Telnet/K	KEAlink TCP
Telnet/F	FTP Software's PC/TCP
Telnet/W	Wollongong's WIN/TCP for DOS
Telnet/X	Novell's LAN Workplace for DOS
TnPC/NFS	SUN's PC-NFS

Then in **Name** type the name or IP address (in standard nnn.nnn.nnn.nnn format) of the host to call, or wait for the "Service name?" prompt when you attempt to leave command mode.

Telnet Driver Items

When you select a Telnet value in **Port** the following additional items appear on the Session Configuration screen:

Remote Telnet port

The standard Telnet port is 23. You might want to change this value if you are calling something other than a Telnet port on the host.

Tie output mode to

Some Telnet server hosts can support a mode where the client Telnet switches between character mode and line mode on a signal from the host. At the present time, there is no standard way of doing this, but ZSTEM Telnet supports the common non-standard ways. These are:

None Line mode switching is controlled by the user.

Echo Line mode is coupled to the echo setting. When the remote host is echoing, ZSTEM Telnet runs in character mode, when ZSTEM Telnet is echoing, it runs in line mode. The echo setting can be changed at any time using the item **Local echo** on the Session Configuration screen. This is the default mode.

SGA Line mode is coupled to the Suppress Go Ahead (SGA) option. When the remote host asks to Suppress Go Ahead, ZSTEM Telnet runs in character mode, when the remote host isn't suppressing go ahead, ZSTEM Telnet runs in line mode.

Echo/SGA Line mode is coupled to both echo and Suppress Go Ahead. ZSTEM Telnet runs in character mode if and only if the remote host is echoing and is suppressing go aheads. Otherwise ZSTEM Telnet runs in line mode. This mode is compatible with some UNIX Telnet client implementations.

Output mode

The Telnet driver can either forward each character as you type it (**Character**) or can save up a "line" of characters and send them all in one packet when you type a line ending character (**Line**). Line mode is much more efficient in usage of network bandwidth and gives better response time when the network is large or slow. Line mode doesn't normally work with "full-screen" programs. The default mode is **Character** because it will work with every host. However, you should choose line mode if your system allows it.

When the Telnet driver is in line mode, the line being typed is echoed locally by ZSTEM so you can see what you are typing. If you type an ASCII control character which is treated as data (either it isn't special or it was preceded by the literal next character), it is displayed in a printable format as ^c where "c" is the non-control character. If the echo setting is not local when in line mode, the remote host will also echo the line when it receives it, so there will be two copies of the line displayed.

Send synch with IP, etc

The Telnet protocol normally requires that signals which interrupt the remote host be sent with a "Telnet synch sequence". However, some client TCP implementations don't send the Telnet synch sequence. In ZSTEM Telnet you can prevent the sending of synch sequences in case the remote host doesn't process them. By default, ZSTEM Telnet will attempt to send synchs. However, if the TCP package upon which ZSTEM Telnet is running doesn't support urgent data (sometimes called out-of-band data) then ZSTEM Telnet will never send synch sequences (since they require sending urgent data).

Initiate option setup

Some host Telnets do not allow the client Telnet to initiate option negotiation. However, it is normally the client's responsibility. This option affects the state of options when a new connection is established. If ZSTEM Telnet can initiate option negotiation, it will attempt to force the host Telnet to match its default setup. If not, it will change its setup to the Telnet default. The setup concerned is 7/8 data bits (and binary if coupled) and local or remote echo (and line mode if coupled).

Tie binary to 8-bit data

The Telnet protocol standard indicates that Telnet is a 7-bit protocol and that if you want to send and receive 8-bit data you must negotiate the binary option. A permissible (but discouraged) extension is to send 8-bit data without negotiating binary. However, the behavior of the Telnet conversation is not specified when the binary option has been negotiated, so the binary option won't work unless both ends agree on what binary means. ZSTEM Telnet interprets binary to mean that 8-bit data can be exchanged and that no newline translation takes effect, but all character interpretation is as normal. If this corresponds with your host's interpretation of binary, you might want to couple the binary option to 8-bit data mode. When coupled, ZSTEM Telnet will set the communication to 7-bit when it cannot negotiate binary and will attempt to negotiate binary if you select 8-bit communication. When not coupled, ZSTEM Telnet will never initiate negotiation of binary and will not modify the communication path if binary is negotiated. The default is no coupling.

Show network data in hex

If you have trouble, you can enable a hex display of all data sent to or received from the network. This display intrudes upon the normal conversation, so it precludes using full-screen applications when it is turned on. It is primarily useful if you understand the Telnet protocol or if you are making a record for reporting a problem. By default this display is disabled.

Show option negotiation

You can also enable display of all Telnet option negotiations for debugging purposes. This option is much less likely to intrude on full-screen applications than the hex data display because options are not usually negotiated during a full-screen application. By default this display is disabled.

Char paired with <CR>

The Telnet protocol requires that newline be sent as either CR/LF or as CR/NUL. The default is **<LF>**.

Local char interpretation

Special characters can be interpreted locally and sent to the Telnet server as Telnet sequences, or they can simply be sent as themselves and the interpretation of them be left to the host operating system. Remote host interpretation is the default, except when the Telnet driver is running in line mode. In line mode there is always local interpretation.

Terminal Type Negotiation

ZSTEM performs terminal type negotiation according to RFC 1091. If the host has not implemented this option, the negotiation may change your terminal type to some unsuitable value. You can set the value to **Current** which restricts ZSTEM to negotiate only the one terminal type selected on the General Configuration screen. The default value is **All** which allows ZSTEM to offer all the terminal types it emulates and negotiate the most suitable type.

TABLE 4.2
Telnet Options Supported by ZSTEM Telnet

Binary (RFC 856)
ZSTEM Telnet will run in binary mode in both directions if requested.

Suppress Go Ahead (RFC 858)
ZSTEM Telnet will never send Go Aheads and will always ignore received Go Aheads. However, it will let the remote host negotiate whatever state of Go Ahead for itself that it wants. If ZSTEM Telnet is allowed to initiate option negotiation, it will ask the remote host to suppress sending Go Aheads.

Echo (RFC 857)
ZSTEM Telnet will support either local or remote host echo of the data typed at the keyboard. It will never agree to echo network traffic back to the remote host. If ZSTEM Telnet is allowed to initiate option negotiation and **Local echo** on the Session Configuration screen is disabled, ZSTEM Telnet will ask the remote host to echo.

Timing mark (RFC 860)
ZSTEM Telnet never initiates any timing marks, but will respond to them.

Terminal type (RFC 1091)
ZSTEM Telnet fully supports the latest terminal type RFC (1091). When first asked, it will claim to be the type of terminal currently set. On subsequent requests it will cycle through the complete list and will restart after sending the last type twice. The terminal types it will respond with are: DEC-VT320, DEC-VT220, DEC-VT100, DEC-VT52.

Window size (RFC 1073)
ZSTEM Telnet claims to be the actual size (80x24 or 132x24) in VT modes.

Terminal speed (RFC 1079)
ZSTEM Telnet always claims to be 9600, 9600.

Remote flow control (RFC 1080)
ZSTEM Telnet allows this option but doesn't really do anything with it, as it only applies when the user is at a terminal connected to a system running the client Telnet.

Linemode (RFC 1116)
Because RFC 1116 is not yet a standard, ZSTEM Telnet implements all the common non-standard ways of switching between line mode and character mode. See the item **Tie output mode to** for details.

Use DEC-xxx type names

The terminal names used during terminal type negotiation as defined in RFC 1091 include DEC-VT320, etc. However, most host Telnet servers use shorter names, such as VT320, etc. If you want to use the long names, set this item to **Y**. The default is to use the short form.

The following six items define the characters which have special functions when **Output mode** is **Line** or **Local char interpretation** is **Y**. If you don't want a character defined for one of these functions, set the item to **off**, which disables special character recognition. You can enter the value in various forms: for example, you could set the item **EraseWord** to **^J** by pressing CTRL+J or typing **^J** or the hex value **0A**. You can even enter C1 code values in the range 84 through 9F (hex). You should avoid 90, 98, 9B and other codes which the terminal uses.

NewLine

Sends the Telnet newline sequence (and ends the line in line mode). Default is **CR**.

Literal

Typing the literal next character causes the next character typed to be treated as a normal character even if it is normally a special character. The default literal next character is **CTRL-V**.

Erase

Line editing character which has a destructive backspace effect. The default is **DEL**, the character sent by BACKSPACE.

EraseLine

Line editing character which deletes the entire input line. The default is **CTRL-U**.

EraseWord

Line editing character which deletes the last word on the line. The default is **CTRL-J**. This works in line mode only as there is no defined Telnet sequence for erase word.

Reprint

Line editing character which reprints the entire input line. The default is **CTRL-R**.

The following five items define the characters which send special network control sequences. You can enter values in the same way as the preceding items.

Synch
Sends the Telnet synch sequence. Default is **CTRL-A** but off. See **Send synch with IP, etc** for more information about synch sequences. If you force the sending of a synch with this option, the synch will be sent even if the underlying network support won't send it as urgent data. Some hosts will accept a non-urgent synch.

Break
Sends a Telnet break sequence. Default is **CTRL-Y**. The ZSTEM Break-to-host signal, F5 on most PC keyboards, also sends a Telnet Break.

Interrupt
Sends a Telnet interrupt process sequence. Default is **CTRL-C**.

AbrtOutpt
Sends the Telnet abort output sequence. Default is **CTRL-O**.

AYT
Sends the Telnet are-you-there sequence. Requests that the host Telnet respond if it is still alive. Usual response is a bell or a line of output. Default is **CTRL-T**.

Connecting a Session

By default, when ZSTEM starts, or whenever you change the port configuration, ZSTEM immediately tries to connect to the configured port. This is convenient, only if the port is usually available.

You can change the item **Autoconnect** on the General Configuration screen to **N**. If you do, when ZSTEM starts, it stays in command mode, and does not try to connect to the configured port. Then you initiate a host connection in either of two ways:

- If you press RETURN, ZSTEM will go into terminal mode and open the session.
- Or, you could have a startup softkey definition, to be executed at this time, that configures a port and then uses the ZSTEM command OPEN to see if the port is available. The softkey could use the instruction <Fail goto nn> to determine if the connection was successful. The softkey could change the port configuration until it finds a successful connection. This implements a network rotary scheme.

On startup, ZSTEM can send a reset command to the network software. The effect of the reset depends on the network. Typically, a reset will clear all connections and initialize the card. On a well-behaved system, the reset should not be necessary. If

you want to ensure that the port is initialized on startup, and you have not done any pre-configuring which would be undone by a reset, change the item **Reset on startup** to **Y**. The default is **N** so that ZSTEM does not send a reset.

Service Directory

On some networks, you can obtain a list of services available for the current session. In a LAT session, you can display a list of service-providers obtained from the network. In a ZLAN session, you can display the network configuration obtained from the interface card. To display a list of available services in this session:

- At the "ZSTEM?" prompt, type **DIRECTORY** and press RETURN. You can shorten this to **DIR**.

Communication

Ending a Session

To disconnect from the host:

- Log off the host, or follow whatever procedure the host expects to end your session.
- Press Alt+Z to obtain the "ZSTEM?" prompt.
- Type **HANGUP** and press RETURN. You can shorten this to **HA**. The following prompt will be displayed:

```
Hangup and exit (N):
```

- To only disconnect, press RETURN

  or

  To disconnect, exit from ZSTEM, and return to the operating system, press Y, RETURN.

If the current session is on a serial port, ZSTEM disconnects by holding the COM port's DTR line FALSE for one second. Most modems will hangup. If your modem uses a different pin to signal disconnect, you could build a special cable to redirect DTR to that pin. The printer port's DSR line is also held FALSE.

If your current session is on a network port, ZSTEM disconnects the network session.

If you are capturing data (see Chapter 9, "Simple File Transfer"), and a DISK write file is open, it will remain open after you disconnect, provided you do not exit from ZSTEM.

When You Lose a Connection

You can program a special softkey called the Linedrop Softkey which ZSTEM will execute if it loses the connection to the host.

If you are using a modem, and you lose your connection to the host, the modem detects the loss of carrier and lowers the Data Carrier Detect signal. (DCD is pin 8 on a DB25 connector.) ZSTEM's reaction depends on the item **Modem disconnect delay** on the Session Configuration screen. If DCD remains inactive for the specified interval, ZSTEM takes the following action:

60 ms If DCD is inactive for 60 milliseconds, DTR and RTS are dropped. If you have programmed the Linedrop Softkey, and ZSTEM is in terminal mode (not in command mode) or transferring a file, the Linedrop Softkey is executed. Otherwise, ZSTEM reverts to command mode and displays the message "Session Disconnected."

2 sec If DCD is inactive for two seconds, DTR and RTS are dropped. This longer interval may better suit a noisy line. If you have programmed the Linedrop Softkey, and ZSTEM is in terminal mode (not in command mode) or transferring a file, the Linedrop Softkey is executed. Otherwise, ZSTEM reverts to command mode and displays the message "Session Disconnected."

2 sec(Linedrop)
If you have programmed the Linedrop Softkey, and ZSTEM is in terminal mode (not in command mode) or transferring a file, and DCD is inactive for two seconds, DTR and RTS are dropped and the Linedrop Softkey is executed. Otherwise, the carrier loss is ignored. This is the default.

No Disconnect
Carrier loss is always ignored.

If you are connected to the host through a network which provides notification of disconnect, and your session is disconnected, the Linedrop Softkey is executed.

To program (or change) the Linedrop Softkey,

- At the "ZSTEM?" prompt, type **LINEDROP** and press RETURN. You can shorten this to **LIN**. The screen is cleared. If the Linedrop Softkey is already programmed, its program is displayed.
- You can enter and edit a program for the Linedrop Softkey in the same way as you would a regular softkey. The Linedrop Softkey starts in command mode at the "ZSTEM?" prompt. See Chapter 11, "Using Softkeys." If you want to get back to command mode without making any change to the Linedrop Softkey, press CTRL+BREAK.

States of the Ports After ZSTEM Exits

ZSTEM changes the state of all the serial or network ports it uses. However, it saves the state the ports were in before ZSTEM was run, and may restore the ports to their original state before it exits. The actual state of a port after ZSTEM exits depends on whether it is a serial or network port, and the reason why ZSTEM exited. ZSTEM can exit because:

- you gave the EXIT command,
- you gave the HANGUP command with the "Hangup and exit" option (see "Ending a Session"), or
- you gave the RUN or SHELL command to temporarily go back to the operating system.

Communication

Serial Ports

The reason why ZSTEM exited, together with the value of the item **Restore port** determine the state of the communications port after exiting.

If you set this item to **Exit** or **Exit+DOS call**, ZSTEM will attempt to restore the port to the state it was in before you ran ZSTEM.

The following section describes the conditions after different "exits" when **Restore port** on the Session Configuration screen is set to **Exit** or **Exit+DOS call**. Whether or not the exit causes a hangup depends on the state the ports had before you ran ZSTEM.

EXIT

When no program is using a port, the port is normally disabled. Therefore, if you exit to "no program", this will normally cause a hangup on the port. However, if you exit to a terminate-and-stay-resident (TSR) program, this will likely NOT cause a hangup.

HANGUP with "Hangup and exit" option

In general, the ports are restored to the state they had when you ran ZSTEM, except the DTR and RTS lines of the communications port and printer port which are FALSE after the exit. However, if you exit to a TSR program that had been using the port, DTR and RTS might be changed, and the requested hangup might not occur.

RUN or SHELL

During the temporary exit from ZSTEM, only the interrupt enable and vector will be restored to the states they had before you invoked ZSTEM. This should not cause a hangup; the host will probably not notice. Upon returning to ZSTEM, the ports are reinitialized.

If the item **Restore port** on the Session Configuration screen is set to **Never**, the port will be left in its present state when ZSTEM exits. The following section describes the conditions after different "exits" when this item is set to **Never**.

EXIT

Ports are not restored. But the interrupt enable and vector will be restored to the states they had before you invoked ZSTEM. This should not cause a hangup; the host will probably not notice. You could run another program, communicating with the same host.

HANGUP with "Hangup and exit" option

The ports are not restored. However DTR and RTS of the communications port the printer port are FALSE after the exit.

RUN or SHELL

Nothing in the serial ports is changed before calling the other program or when returning to ZSTEM.

Communication

Network Ports

If ZSTEM exits because you gave the EXIT command, or the HANGUP command with the "exit" option, most network sessions are disconnected. However, if you are using LAT with the LATDAT data area, you can preserve the sessions, and continue them later. See the section "LAT Driver" in this chapter.

If you give a RUN or SHELL command to temporarily go back to the operating system, ZSTEM leaves network connections up; it does not disconnect.

Multiple Sessions

In this manual, the term session refers to a connection via a port to a host. The port configuration of your session is described by its Session Configuration screen. It is not necessary to actually start communicating with the host to have a session, although that is usually why you start one.

You can have one to four sessions in existence at the same time. The first session exists when you run ZSTEM. You don't have to specifically create it; ZSTEM creates the first session itself. Some networks allow you to have multiple sessions on the same port (LAT, CTERM, NetBIOS, ZLAN, Telnet, BAPI). On other networks, if you wish to have more than one session, each must use a different serial or network port. Each session has a separate Session Configuration screen. For each session, the item **Session *N* name** is different. The items on the Session Configuration screen apply to that session only.

Only one session, the current session, can communicate at a time. When you change to a different session, your display from the previous session is not preserved. When you run a configuration that was saved with multiple sessions, all the sessions you created are re-created for you.

The default value of **Session 1 name** is **FirstSession**, but you can change it.

On some networks, (e.g. LAT, ZLAN) the network itself may offer connection to one of several services. To switch services, log off the current service (or use the ZSTEM command HANGUP without the "exit" option) and type the new service in the item **Name** on the Session Configuration screen.

On some networks, (e.g. Ungermann-Bass, Bridge/3-Com) the network itself may offer multiple sessions. You can control these sessions with suitable network commands. In this manual, we will continue to use the term session to mean a connection via a port to a host.

Creating Additional Sessions

One session exists by default when you invoke ZSTEM. You can create up to three more sessions. To create an additional session,

- At the "ZSTEM?" prompt, type **CREATE** and press RETURN. You can shorten this to **CR**.
- ZSTEM displays a new Session Configuration screen. All the items on this screen apply only to the new session; there is a separate screen for each existing session. You can type a session name in the item **Session *N* name**.
- ZSTEM may also require you to enter **Name**, which holds the external name or address of special network devices.
- Enter the desired values on the screen to define the session. Enter the values according to the preceding sections "Serial Ports and Modems" or "Networks".
- Press RETURN twice to leave command mode. The new session is now the current session.

Change to a Different Session

You can communicate with only the current session. If you have more than one session in existence, you can select one of them to be the current session. The commands SWITCH and NEXT make another existing session become the current session. The former session is not lost; you can give the SWITCH or NEXT command and continue it. To change to a particular session:

- At the "ZSTEM?" prompt, type **SWITCH** and press RETURN. You can shorten this to **SW**.
- At the prompt:

  ```
  Resume session (Space for list)?
  ```

  Type a session number, or press SPACE to obtain a list of existing sessions.

To change to the connected session having the next-higher session number:

- At the "ZSTEM?" prompt, type **NEXT** and press RETURN. You can shorten this to **N**. The new session name and number is given at the bottom right corner of your screen.

These commands change sessions. They do not switch between the services offered by some networks.

Removing a Session

The section "Ending a Session" told you how to disconnect from a host. However, ZSTEM considers that the session still exists. If you leave Command Mode without changing to a different session, ZSTEM attempts to reconnect to that host. To remove the session entirely, you must perform the steps in the section "Ending a Session," and then give the DESTROY command.

To remove a communications session from the list of existing sessions:

- At the "ZSTEM?" prompt, type **DESTROY** and press RETURN. You can shorten this to **DES**. The following prompt is displayed:

```
Destroy session (Space for list)?
```

- To remove a session, press its session number and RETURN,

  or

  to see the list of existing sessions, press Space,

  or

  to go back to command mode, press RETURN.

If you remove the current session, ZSTEM switches to the next session. You cannot remove the last session.

Communication

Local Mode

ZSTEM normally sends the characters you type to the host, and displays received characters on the monitor. This is sometimes called online mode.

You can also select local mode. In local mode, the characters you type are not sent to the host; instead, they are displayed directly on your monitor (and printed, if received characters are being sent to the printer). Although ZSTEM stops sending characters, it will not disconnect from the host. ZSTEM will buffer characters it receives from the host until the buffer threshold is reached. It will then send an Xoff to the host. You are not completely isolated from the host; the Break-to-host signal, F5 on your keyboard, still works as it does in online mode.

You can use Local Mode to change terminal characteristics which can only be set by control sequences. After you go into Local Mode, type the control sequence on your keyboard. This has the same effect as if the sequence came from the host. If "received characters" are being sent to the printer, the sequence you type is sent to the printer. You can use this to set printer characteristics. See Chapter 8, "Printer."

The LOCAL command shows you the current mode, and lets you select either Local Mode or online mode.

- To select Local Mode: at the "ZSTEM?" prompt, type **LOCAL Y** and press RETURN. You can shorten this to **LO Y**.
- To select online mode (the normal state): at the "ZSTEM?" prompt, type **LOCAL N** and press RETURN. You can shorten this to **LO N**.

You can also select online mode or Local Mode with the item **Online mode** on the General Configuration screen. The values are **Online** and **Local**.

There is a special variation of Local Mode called Local Help Mode, which saves the existing screen before going into Local Mode. See Chapter 14, "Programmer Reference."

More Communications Options

Clear

To reset all communication processes:

- On the General Configuration screen, select the item **Clear**.
- Press SPACE to highlight the value **Comm**.
- Press RETURN to reset everything.
- Press RETURN twice to get out of command mode.

The clear operation has the following effects on the current session:
clears the serial port device,
clears transmit and receive buffers, and
resets all XOFF states.

The clear operation has the following effects on the overall program:
clears the keyboard,
aborts printing, and
aborts control sequence processing.

Character Echo

A session can operate in two echo modes. The usual is host echo mode. In host echo mode, ZSTEM itself does not display the data it sends to the host. The host processes the characters it receives and echoes them back to be displayed on your screen. This is also known as full duplex mode.

If you set the item **Local echo** on the Session Configuration screen to **Y**, ZSTEM displays characters itself, as it sends them to the host. This arrangement is called local echo mode or half-duplex.

Intercharacter Delay

The host may be unable to accept characters, softkey-generated text and file transfers as fast as the baud rate allows. If you have this problem, you can instruct ZSTEM to delay a few milliseconds after it sends each character, rather than send the characters as fast as it can. The item that controls this time delay is **Intercharacter delay** on the Session Configuration screen. You can set the delay for this session to any value in the range 0 to 255 milliseconds.

There is another way to slow down the sending rate which affects file transfer only. See Chapter 9, "Simple File Transfer."

Communication

Chapter

5

Emulating a VT320, VT220, VT100, VT52

VT320

Introduction

ZSTEM, just like a real VT320 , can be used as a VT320, VT100 or even a VT52 terminal. This chapter shows you how you can set up your emulator to be one of these text terminals. It tells you about the basic capabilities of each terminal, and the additional text capabilities that ZSTEM provides.

VT320

Setting Up Your Terminal

You must specify your terminal type on the General Configuration screen to ensure that your emulator functions properly as a terminal. ZSTEM gives you the choice of emulating either a VT320 with 7-bit or 8-bit controls, a VT100, or a VT52 terminal. It is your host application that determines the type of terminal you should emulate.

As a VT320

To function as a VT320 terminal, on the General Configuration screen set the item **Terminal mode** to **VT300/7-bit**. If the host can accept 8-bit control codes, you could set this item to **VT300/8-bit**. If you are unsure, see your system administrator or leave it set to **VT300/7-bit**.

In some cases, the host will query your terminal and ask it to identify itself. On the General Configuration screen set the item **VT300 terminal id** to **VT320**.

If you are using your emulator as a VT320 terminal and you notice irregularities in the display, your application might have been written for a VT100 terminal. Try setting up your emulator as a VT100 terminal as explained below.

As a VT100

If your host application has been written for a VT100 terminal, on the General Configuration screen set the item **Terminal mode** to **VT100**.

In some cases, the host will query your terminal and ask it to identify itself. On the General Configuration screen set the item **VT100 terminal id** to **VT100, VT101, VT102**, or **VT125**.

As a VT52

If your host application has been written for a VT52 terminal, on the General Configuration screen set the item **Terminal mode** to **VT52**.

VT320 Features

ZSTEM supports most of the ANSI control sequences; see Appendix B for a complete list. A detailed discussion of text display is contained in Chapter 6, "Display."

Character and Line Attributes

ZSTEM displays all possible combinations of the VT character attributes: bold, blink, underline and inverse. The only exception is the underline attribute on a CGA adapter; because the CGA has limited vertical resolution, ZSTEM displays underline as inverse.

In addition, ZSTEM can produce a true 132-column text display on any graphics adapter. You can use ZSTEM's Color Palette Configuration screen to add color to text. ZSTEM also implements the ISO color commands, which are not implemented on real VT terminals.

ZSTEM accurately displays double-high and double-wide characters on all graphics adapters, even the CGA!

Character Sets

By factory default, the DEC Multinational Character Set (MCS) is mapped into the code table of a VT320. The 7-bit compatible, or left half of the table contains the ASCII character set. The 8-bit compatible, or right half of the table contains the DEC Supplemental Graphics Set. The VT320 terminal allows you to substitute either DEC-defined or application-defined character sets for the default Multinational Character Set.

ZSTEM can display all of these character sets. More information about changing character sets can be found in Chapter 6, "Display." The following is a brief description of the additional character sets available on the VT320 and ZSTEM.

National Replacement Character Sets

You can substitute 7-bit National Replacement Character (NRC) sets for the standard ASCII character set. ZSTEM provides the twelve DEC NRC sets with corresponding national keyboard layouts.

Down-line Loadable Character Sets

ZSTEM implements the Dynamically Redefinable Character Set (DRCS) provided by the VT320 terminal. This allows an application to define special character sets. This method is often used to define character sets containing mathematical or technical symbols.

Special

There are additional, DEC-defined character sets which you can substitute for the default character sets: ISO Latin 1, DEC Special Graphics, and DEC Technical character sets. In addition, ZSTEM allows you to use the IBM Graphics character set.

Compose Character

ZSTEM implements two-stroke and three-stroke compose sequences. See Chapter 7, "Keyboard" for more details.

Scroll

ZSTEM matches the VT terminals in giving you the choice of either smooth or jump scroll. It also has a software scroll option for those non-standard graphics adapters which cannot perform hardware scrolling. See "Scroll" in Chapter 6, "Display" for more details.

Other VT320 Operational Parameters

This section describes the use of some ZSTEM configuration screen items not mentioned elsewhere in the manual. All of them are on the General Configuration screen; all of them correspond to VT Set-Up Screen features.

User Defined Keys, User Features

User Defined Keys are the VT320 functions SHIFT+F6 through SHIFT+F20. They can be programmed by control sequences given in Appendix B. When the item **User keys locked** is set to **Y**, the host cannot alter the UDK definitions.

When the item **User features locked** is set to **Y**, the host cannot alter certain user-preference features. These features are: auto repeat, smooth/jump scroll, light/dark screen, tab stops, keyboard lock.

New Line

If the item **New line mode** is set to **N**, a received LF, FF, or VT code will move the cursor to the next line in the same column; pressing RETURN sends a CR code only. If **New line mode** is set to **Y**, a received LF, FF, or VT code will move the cursor to the first column of the next line; pressing RETURN sends CR and LF codes.

Warning Bell

The item **Warning bell** controls whether or not a warning bell is sounded for operating errors and on receiving the ASCII BEL code.

Reset Terminal

If you select the item **Reset terminal**, the VT320 terminal features are reset to their default settings.

VT100 Features

Applications written for the VT100 series terminals are still widely used. To function as a VT100 terminal, on the General Configuration screen set the item **Terminal mode** to **VT100**. ZSTEM emulates all of the important features of the VT100 series including:

- 132 column mode
- double-high double-wide characters
- VT100 line graphics
- smooth scrolling
- insert/delete line
- printer status
- printer controller
- print screen

ZSTEM has added color to its emulation of the monochrome VT100 by supporting the ISO color extensions to the ANSI escape sequences.

The VT100 keyboard is a subset of the VT200/300 keyboard. ZSTEM maps the VT100 keys in the same place it maps VT300 keys of the same name. For instance, the VT100 PF1 through PF4 keys are in the same location as PF1 to PF4 on the keyboard layout diagrams in Chapter 7, "Keyboard."

VT52 Features

ZSTEM will function as a VT52 terminal when **Terminal mode** on the General Configuration screen has been set to **VT52**. A summary of VT52 control sequences is in Appendix C.

Chapter

6

Display

Introduction

Introduction

This chapter describes how ZSTEM emulates the display of the VT320 terminal with your PC's video adapter and monitor.

This chapter tells you how to set up ZSTEM to make the best use of your graphics adapter and monitor. It also tells you how ZSTEM emulates the special display features of the VT terminals: 132 column mode, 16 colors, high resolution, character attributes, special character sets, smooth scrolling and more.

This chapter refers to many configuration items; most of these are on the Display Configuration screen. To access this screen, at the "ZSTEM?" prompt, press C, SPACE, D, and RETURN.

Display Type

If you chose Automatic as the default display type when you installed ZSTEM, it will automatically determine which of the major video adapter types (VGA, EGA, CGA, Hercules or MDA) is installed in your PC. With most adapters, this is the appropriate value.

ZSTEM provides loadable drivers for many special video adapters. Most "superset" boards will function as one of the major video adapter types. However, if you want to use the advanced features of one of these special boards, you must install its special driver.

Selecting a Video Adapter

ZSTEM's basic configuration supports all of the major display adapters. You will be able to select other special adapters if you have made their loadable drivers available when you installed ZSTEM.

The following are the values available for the item **Display Adapter** on the Display Configuration screen in ZSTEM's basic configuration:

Automatic
This default value is used for standard video adapters, those that are truly compatible with VGA, EGA, CGA, Hercules and MDA conventions. This value will often work for a "special" board in low resolution mode, with or without a MultiSync monitor. This value does NOT work for an EGA with monochrome monitor, nor a 64K EGA. Refer to table 6.1.

CGA-like
This value forces an EGA or VGA adapter to run in CGA mode.

EGA-like

This value forces a VGA adapter to run in EGA mode. It is also useful for EGAs which are not fully hardware compatible and do not function with the **Automatic** value.

VGA-like

Some VGAs do not have a high-resolution mode; this value suppresses ZSTEM's use of high resolution mode. It is also useful for VGAs which are not hardware compatible and do not function with the **Automatic** value, in particular VGAs using Liquid Crystal.

Text

Use this value if you have a Monochrome Display Adapter. You can also use it to operate any graphics adapter in text mode for faster output and, on CGA, 16 colors with ISO color escape sequences. The item **Text code page** determines the character set used. The default value **Country** uses the current PC code page. If you want to use some other code page, or your DOS is prior to version 3.3, change this item to a specific code page number.

EGAmate

The EGAmate is an inexpensive hardware accessory board which attaches to a standard EGA or hardware compatible adapter. With the EGAmate, your standard EGA will display 800 pixels of horizontal resolution, the same as a VT320. This significantly improves the appearance of 132-column. (Normally, a standard EGA gives 640 pixels of horizontal resolution.) The EGAmate is available from KEA Systems Ltd.

VGA-MultiSync

This value can be used if you have an IBM VGA board or true compatible and a MultiSync monitor. It displays 800 pixels horizontal resolution.

You will be able to select additional adapters if you have made their loadable drivers available when you installed ZSTEM. These additional choices, as well as the basic choices for the item **Display Adapter** on the Display Configuration screen are given in table 6.1. This table also gives the resolution available with every adapter/monitor combination. You should check the README file on the distribution diskette(s) for any recent additions to this table.

NOTE: After you have selected a value which uses a device driver, ZSTEM warns you with:

```
Save and restart ZSTEM to effect change
```

You must first SAVE ZSTEM and then run it again before the new display value will take effect. You can either SAVE your configuration or the entire program. Refer to "Saving Your Options" in Chapter 3 for more details.

TABLE 6.1
Video Displays

Video Adapter Board	Monitor	Value of Display Adapter	Low Res.	High Res.	Driver	Notes
CGA	C	Automatic	640x200	640x200	internal	
EGA 128/256K	EC MSd	Automatic	640x350	640x350	internal	
EGA	C	Automatic	640x200	640x200	internal	
VGA	VG MSa	Automatic	640x480	720x480	internal	
Hercules	Mono	Automatic	640x300	720x300	internal	
VGA	MSa	VGA-MultiSync	640x480	800x480	internal	
EGA, VGA	C	CGA-like	640x200	640x200	internal	
EGA (generic)	EC MSd	EGA-like	640x350	640x350	internal	
VGA (generic)	VG MSa	VGA-like	640x480	640x480	internal	
MDA	Mono	Text			internal	
(all)	(all)	Text			internal	
EGA 128/256K with EGAmate	EC MSd	EGAmate	640x350	800x350	internal	
EGA 64K	EC MSd	64K-EGA	640x350	640x350	ZVMONEGA	3
EGA 64K with EGAmate	EC MSd	64K-EGAmate	640x350	800x325	ZVMONEGA	3
EGA 128/256K with EGAmate	Mono	Mono-EGAmate	640x350	800x325	ZVMONEGA	
EGA 128/256K	Mono	Monochrome-EGA	640x350	640x350	ZVMONEGA	
EGA 64K with EGAmate	Mono	Mono-EGAmate	640x350	800x325	ZVMONEGA	
EGA 64K	Mono	Monochrome-EGA	640x350	640x350	ZVMONEGA	
AHEAD EGA Wizard	MSd	EGA-Wizard	640x480	640x480	ZVAHEAD	
AHEAD EGA Wizard Deluxe	MSd	EGA-Wizard-Deluxe	640x480	800x600	ZVAHEAD	
AHEAD VGA Enhancer	MSa	EGA-Wizard-Deluxe	640x480	800x600	ZVAHEAD	
AHEAD VGA Wizard	MSa	EGA-Wizard-Deluxe	640x480	800x600	ZVAHEAD	
AT&T 6300	Mono	AT&T-640x400	640x400	640x400	ZVATT	
Olivetti M24/M28	Mono	AT&T-640x400	640x400	640x400	ZVATT	
COMPAQ Portable III	Mono	AT&T-640x400	640x400	640x400	ZVATT	
Toshiba 3100/3200	Mono	Toshiba	640x400	640x400	ZVATT	
DEC VAXmate with monitor	-	VAXmate	640x400	640x400	ZVATT	
ATI VIP	VG MSa	ATI-Analog	640x480	640x480	ZVATI	
ATI EGA Wonder	EC MSd	ATI-EnhancedColor	640x350	640x350	ZVATI	
ATI Wonder 800	EC MSd	ATI-EnhancedColor	640x350	640x350	ZVATI	
ATI VIP	EC MSd	ATI-EnhancedColor	640x350	640x350	ZVATI	
ATI EGA Wonder Ver 3+	MSd	ATI-MultiSync	640x480	640x480	ZVATI	
ATI Wonder 800	MSd	ATI-MultiSync	640x480	800x560	ZVATI	
ATI VIP	MSa	ATI-MultiSync	640x480	800x560	ZVATI	
ATI VGA Wonder	MSa	ATI-MultiSync	640x480	800x600	ZVATI	
DFI EG-3000 27MHz	EC MSd	DFI-EG3000	640x350	1056x350	ZVDFI	
DFI EG-3000 27MHz	Mono	Mono-DFI-EG3000	640x350	1200x350	ZVDFI	
DFI EG-3000 24MHz	MSd	DFI-EG3000	640x350	1056x350	ZVDFI	
DFI EG-3000 24MHz	MSd	DFI24-EG3000	640x350	1056x300	ZVDFI	2
DFI EG-3000 24MHz	Mono	Mono-DFI24-EG3000	640x350	1056x350	ZVDFI	

TABLE 6.1 (Continued)

Video Adapter Board	Monitor	Value of Display Adapter	Low Res.	High Res.	Driver	Notes
Genoa SuperEGA HiRes+	MSd	Genoa-SuperEGA	640x480	800x600	ZVGENOA	
IBM MCGA (PS/2 25,30)	VG MSa	MCGA	640x480	640x480	ZVMCGA	
IBM XGA	VG MSa	XGA	640x480	720x480	ZVXGA	4
IBM XGA	MSa	XGA-MultiSync	640x480	800x500	ZVXGA	4
Orchid VGA	MSa	Orchid-VGA-MSync	640x480	800x600	ZVORCHID	
Orchid ProDesigner II VGA	MSa	Orchid-VGA-MSync	640x480	800x600	ZVORCHID	1
Relisys RB5155VG	MSa	Orchid-VGA-MSync	640x480	800x600	ZVORCHID	
Paradise Autoswitch EGA480	MSd	Paradise480-MSync	640x480	1056x350	ZVPARDSE	
Paradise Autoswitch EGA480	EC MSd	Paradise480-Fixed	640x350	1056x350	ZVPARDSE	
Paradise VGA Plus	MSa	ParadiseVGA-MSync	640x480	800x600	ZVPARDSE	
Paradise VGA 16	MSa	ParadiseVGA-MSync	640x480	800x600	ZVPARDSE	
Paradise VGA PRO	MSa	ParadiseVGA-MSync	640x480	800x600	ZVPARDSE	
Paradise VGA Plus	VG MSa	ParadiseVGA-Fixed	640x480	720x480	ZVPARDSE	
Paradise VGA 16	VG MSa	ParadiseVGA-Fixed	640x480	720x480	ZVPARDSE	
Paradise VGA PRO	VG MSa	ParadiseVGA-Fixed	640x480	720x480	ZVPARDSE	
Sigma VGA/H	MSa	Sigma-VGAH-MSync	640x480	800x560	ZVSIGMA	
Tseng Eva	EC MSd	Tseng-EVA	640x350	800x300	ZVTSENG	2
Tseng Eva/480	EC MSd	Tseng-EVA	640x350	800x300	ZVTSENG	2
NEC GB-1	EC MSd	Tseng-EVA	640x350	800x300	ZVTSENG	2
Tseng Eva/480	MSd	Tseng-EVA-480	640x480	640x480	ZVTSENG	
NEC GB-1	MSd	Tseng-EVA-480	640x480	640x480	ZVTSENG	
VESA compatible	MSa	VESA	640x480	800x600	ZVVESA	
Video-7 VEGA deluxe	MSd	VEGA-Deluxe-MSync	640x480	640x480	ZVVEGA	
Quadram QuadEGA ProSync	MSd	VEGA-Deluxe-MSync	640x480	640x480	ZVVEGA	
Video-7 VEGA VGA	VG MSa	VEGA-VGA	640x480	720x480	ZVVEGA	
Video-7 V-RAM VGA	MSa	VIDEO7-VGA-MSync	640x480	800x600	ZVVEGA	
Video-7 FastWrite VGA	MSa	VIDEO7-VGA-MSync	640x480	800x600	ZVVEGA	
Zenith 449	VG MSa	Zenith-449	640x480	720x480	ZVZENITH	

Monitors:

- C composite color or RGB or composite monochrome
- Mono TTL monochrome (also called "true monochrome")
- EC Enhanced color monitor (EGA type)
- VG VGA fixed frequency (also called "analog")
- MSa Multisync with analog interface
- MSd Multisync with digital interface

Notes:

1 Also most VGAs that use TSENG ET4000 chip set.
2 Item **Maintain Aspect Ratio** compensates for vertical size in high-resolution mode.
3 Four colors only.
4 The item **Reset screen on DOS call** must remain **Y**.

Changing Your Video Adapter

The Install Procedure allows you to select additional display drivers and choose your default display driver. You may need to change this default if you change your hardware configuration. To do this you would change the value of the item **Display Adapter** on the Display Configuration screen. A summary of all possible values of Display Adapter (when the appropriate display drivers are available) is given in Table 6.1. Your README file might contain recent additions to this table.

In some cases your old default video adapter will be so different from your new adapter that ZSTEM won't be able to display properly. In this case, you should use the D command line switch. This switch will force ZSTEM to use a particular video adapter board when it starts up.

The format for this switch is **d:***display-type* where the string *display-type* is one of the allowed values of the **Display Adapter** item. You need to specify enough characters of the value to distinguish it from all other values. If you specify a driver that is not available in the basic configuration, you must make sure that the appropriate driver file is available in your ZSTEM directory. See the section on "Changing Your Loadable Drivers" in Chapter 2, for more information on how to make drivers available.

For example, to start ZSTEM and force it to treat your adapter like a CGA, at the DOS prompt type: **ZSTEM320 /D:CGA-LIKE**

132-Column Mode and Resolution

One of the important features of a VT terminal is its ability to display 132 columns of text. ZSTEM displays both 80 and 132 columns of text on any graphics adapter, even a CGA.

Columns

In the **Columns** item on the Display Configuration screen select **80** or **132**. If you change this item, when you leave command mode any text on the terminal-mode screen is saved in the window back buffer and the screen is cleared. You can view the previously displayed text using the WINDOW command; refer to the section "Recalling Previous Text."

More Than 24 Data Lines

ZSTEM can display a variable number of lines of data. Use command line switch /L:*nn*, or item **Rows (character lines)**. Note, this is the number of data lines; the ZSTEM command line (and status line) always appear one line below the last data line. The maximum number of lines depends on your adapter:

VGA: 24 to 42 lines.

EGA: 24 to 42 lines. If **Maintain aspect ratio** is **Y**, 24 to 36.

CGA and Hercules: 24 lines.

If you change **Rows (character lines)** or **Maintain Aspect Ratio**, ZSTEM will accept the change and display a message that you must save ZSTEM and restart it to produce the effect. If you change **Screen Resolution**, and the current font size is compatible with the new resolution, the effect will occur immediately.

Screen Resolution

Many graphics adapters have both a high resolution mode and a low resolution mode. The increased number of pixels in high resolution mode will give you a sharper image. Unfortunately, the greater number of pixels will also make your PC's display slower. ZSTEM lets you regulate when your graphics adapter will use its high resolution mode.

In the **Screen Resolution** item on the Display Configuration screen you can select one of three values:

- **Normal** means the adapter's normal resolution is always used.
- **High** means the adapter's high resolution mode is always used.
- **80-Normal/132-High** is the default setting. ZSTEM will set your adapter's resolution mode depending on the setting of the **Columns** item. ZSTEM will use its low resolution mode when this item is set to 80, and its high resolution mode when this item is set to 132.

See Table 6.1 for a comprehensive list of display resolution available with all of ZSTEM's display drivers.

Note: When the resolution of your screen changes, the text is re-written at the new resolution.

Aspect Ratio

A VT340 terminal has a resolution of 800x480. The terminal's aspect ratio, or ratio of horizontal resolution to vertical resolution, is greater than that of most PC adapters.

To maintain the same aspect ratio as a real VT340, ZSTEM normally does not use all of your adapter's vertical resolution. If you don't require the correct aspect ratio, and want to use the full vertical range of the adapter, set the item **Maintain Aspect Ratio** to **N**. Lines of text will then be more widely spaced, and graphics will be stretched vertically.

Note: If you are using a 128K EGA with an EGAmate device, and the item **Display Adapter** is set to **EGAmate**, leave **Maintain Aspect Ratio** set to **Y**.

Color

ZSTEM is capable of displaying 16 colors on EGA VGA and XGA graphics adapters. Because of a CGA's hardware limitations, only one color is displayed on CGA adapters. ZSTEM will give you 16 out of a possible 64 colors on EGA adapters and 16 out of a possible 262,144 colors on VGA and XGA adapters.

ZSTEM's Color Palette Configuration screen allows you to adjust the actual color displayed for each of the 16 available color indexes. These color indexes are used by:

- Normal text and text with character attributes mapped to colors;
- Background (1 index);
- ISO color commands (a ZSTEM feature allowing characters and background to have a color attribute).

Color or Monochrome Palette

The Color Palette Configuration screen is used to define the way in which ZSTEM portrays the colors of a VT340 terminal. ZSTEM can represent the sixteen color indexes as actual colors, or as shades of gray.

If the item **Color map** on this screen is set to **Color** , the combined values of the **Red** , **Green** and **Blue** color columns to the right of each index determine the color of that index. If this item is set to **Monochrome** , the value in the **Mono** column to the right of each index determines the shade of gray of that index. The color bar at the far right of the screen shows which color or shade of gray will be displayed for each index. By default, ZSTEM will map indexes to color.

Some adapters, such as the CGA in high resolution mode, and the Hercules, are not capable of displaying gray levels: a color index is either "on" or "off". ZSTEM has two different methods of determining whether a particular color index will be on or off. If the item **Color map** is set to **Color** , ZSTEM will take a weighted average of the **Red**, **Green** and **Blue** color columns to the right of each index to determine whether or not an index is judged to be "on". If this item is set to **Monochrome**, the value in the **Mono** column to the right of each index determines whether or not an index is "on". If the value in the **Mono** column is **0**, the index will be "off". If the value in the **Mono** column is greater than 0, the index will be "on".

Setting Colors

Display

The number of colors available on your Color Palette Configuration screen depends on the graphics adapter that you are using:

VGA For each color index, ZSTEM gives you 64 possible values for each of **Red**, **Green** and **Blue**.

EGA For each color index, ZSTEM gives you 4 possible values for each of **Red**, **Green** and **Blue**.

CGA The CGA adapter has only one bit-plane in high-resolution (640x200) graphics mode. Therefore, only one index on this screen affects a CGA: **7 (Foreground)**.

To adjust the color of a **Color Index**:

- At the "ZSTEM?" prompt, press C, SPACE, C, and RETURN. This displays screen C, the Color Palette Configuration screen.

- Select one of the 16 color indexes by typing its number and RETURN, or press UP ARROW and DOWN ARROW.
- Press LEFT ARROW and RIGHT ARROW to select the **Red Green Blue** or **Mono** column. You can enter any value between 0 and 100 and press RETURN. The resultant colors appear in the color bar to the right. Or, you can press SPACE and BACKSPACE to increase and decrease the color value in increments suitable for your video adapter.
- Repeat the previous two steps as necessary. Then press RETURN again to obtain the "ZSTEM?" prompt.

To restore the settings of the 16 color indexes, select the item **Restore palette to** on the Color Palette Configuration screen. To restore the colors to their "factory" values, select **Default** and press RETURN. To restore the colors to the values in your last SAVEd version of ZSTEM, select **Saved** and press RETURN.

Some VGAs do not produce suitable colors when the default DAC settings are used. The item **VGA colors** lets you change the method of color selection on a VGA.

Standard DAC

This default value is suitable for a standard VGA. You will be able to select from all 256K colors. Overscan is used to provide a backgound that is larger than the text area. You will notice this if you have configured non-black background.

On some VGAs, retrace lines are visible when the background is non-black. If you have this problem, select the value **Non-Standard DAC**.

Non-Standard DAC

Try this value if your VGA is non-standard in some way (or is shared with another card such as an IBM 8514), and the default value produces incorrect colors. You will be able to select from all 256K colors. Overscan is not used.

64 Colors

Use this value if neither of the preceding values produce acceptable color. This value limits a VGA to the 64 colors of an EGA.

16 Shades

Use this value for LCD or Plasma VGAs. It overrides the palette settings to produce 16 distinct gray shades. On a color monitor, it does not produce correct colors.

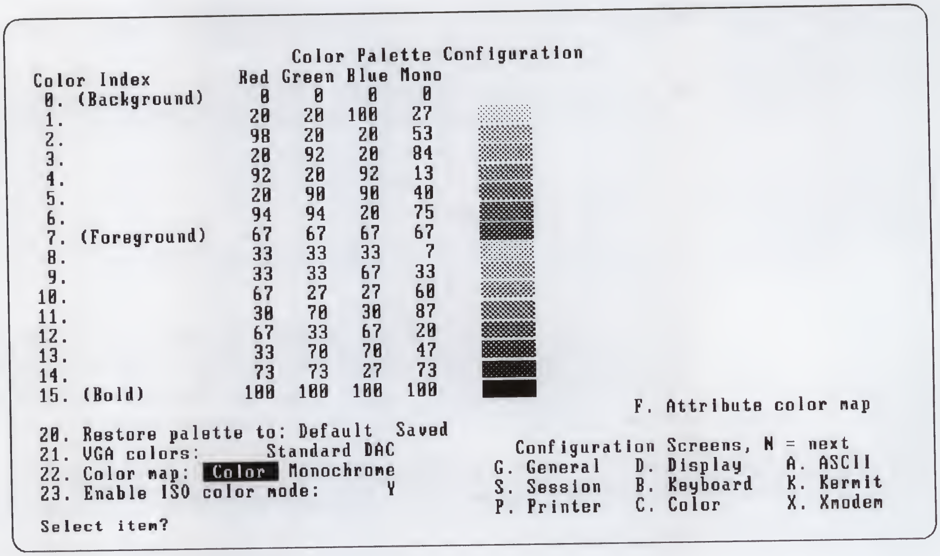


Figure 6.1. Color Palette Configuration screen

Text Color

ZSTEM allows you to display text in color by changing the values on the Color Palette Configuration screen. This is possible because text has an associated color index: normal text maps to index **7 (Foreground)** and bold text maps to index **15 (Bold)**. The background is index **0 (Background)**.

You can also map character attributes -- bold, blink, inverse, and underline -- to various colors. Refer to the following section.

ZSTEM also allows you to display color text with the ISO color escape sequences. This is a special ZSTEM enhancement and is not available on a VT320 terminal. If the item **Enable ISO color mode** on the Color Palette Configuration screen is set to **Y**, ZSTEM will accept ISO color commands to change foreground and background colors. ISO Color Commands are listed in Appendix B.

Character Attributes

VT text has four possible character attributes: bold, blink, underline, and inverse. ZSTEM accurately represents any combination of these attributes on normal and double-high/double-wide text. The only exception is the underline attribute on a CGA adapter (or the EGA with a CGA-style RGB monitor). Because of the CGA's limited vertical resolution, ZSTEM emulates the underline attribute as inverse.

You can optionally map the character attributes to various colors. The Color Mapping Configuration screen, which you can obtain from the Color Palette Configuration screen as item "F", lets you selectively map the four attributes and all their combinations to foreground/background colors.

Some video adapters cannot easily produce the bold attribute. On these adapters (Hercules, CGA, EGA without Enhanced Display), ZSTEM reproduces the bold attribute by double-striking the character. This will produce a bold effect by making the character appear slightly wider than normal.

If you do not like the way ZSTEM produces bold on these adapters, you can use the command line switch R when you start ZSTEM. This switch will cause characters with the bold attribute to appear as inverse. (Note: on other adapters, this will only cause the bold items of ZSTEM's configurations screens to appear as inverse.) You can use the H switch to cancel this behavior in a ZSTEM program that was saved with R in effect.

Character Sets

Codes which your terminal receives from the host are translated to control codes and displayable characters by the current character set. Codes in the range 0 to 127 are referred to as GL, those in the range 128 to 255 as GR.

The following sections discuss different character sets, and how they are used to translate received codes to displayed characters.

Because the current character set also determines the codes sent to the host, see also Chapter 7, "Keyboard."

Supplemental Sets

A supplemental character set usually contains accented characters for European languages. It is generally found in the GR table, or it can be temporarily moved into the GL table for the next character only (single shift). ZSTEM supports all the supplemental sets of the VT300 terminals:

- DEC Supplemental Graphic set (of the DEC Multinational character set).
- ISO Latin 1 supplemental graphic set.
- DEC Technical character set.
- DEC line drawing character set.
- Dynamically Redefinable Character Set (DRCS).

ZSTEM also supports the IBM Graphics set in the range 128 to 255. This set is not available on a VT340.

ZSTEM supports the twelve National Replacement Character Sets (NRCs). See "Other Keyboard Languages" following.

North American Keyboard

If you have chosen the North American keyboard layout, on the General Configuration screen the value of **Keyboard language** is **North American** and the value of **Character set mode** must be **Multinational**.

In Multinational mode, the regular ASCII set is mapped into GL; a supplemental set is mapped into GR. On the General Configuration screen in the item **User Preferred Supplemental**, choose the supplemental set which your host requires: **DEC-MCS**, **ISO Latin 1**, or **IBM Graphics**.

To send and receive codes in the GR set, you need 8 bits of data. If you are using a serial port (COM1, COM2...), ensure that the item **Data bits** on the Session Configuration screen is set to **8**.

Other Keyboard Languages

This section applies to you if your **Keyboard Language** is set to other than **North American**. You can use two major character set translation modes; your host determines which one is appropriate. You should set the item **Character set mode** on the General Configuration screen to **Multinational** or **National**. If you are not sure which mode to use, see your host system administrator.

The following sections describe the two major translation modes.

Multinational Mode

In Multinational mode, the regular ASCII set is mapped into GL; a supplemental set is mapped into GR. You must choose the supplemental set which your host requires in the item **User Preferred Supplemental** on the General Configuration screen. Choose **DEC-MCS**, **ISO Latin 1**, or **IBM Graphics**.

To send and receive codes in the GR set, you need 8 bits of data. If you are using a serial port (COM1, COM2...), ensure that the item **Data bits** on the Session Configuration screen is set to **8**.

In Multinational mode, **Keyboard language** on the General Configuration screen does not affect received codes.

National Mode

In National mode, one of the National Replacement Character (NRC) sets is mapped into GL. The actual NRC set used is determined by the item **Keyboard language** on the General Configuration screen. It can be set to: **British**, **Flemish**, **Canadian(French)**, **Danish**, **Finnish**, **German**, **Dutch**, **Italian**, **Swiss(French)**, **Swiss(German)**, **Swedish**, **Norwegian**, **French/Belgian**, **Spanish**, **Portuguese**, or **Icelandic**.

Only 7 bits are used; GR is unavailable.

Making a National Font the Default

There is an ANSI escape sequence **Esc (B** which loads the ASCII set into table G0. (By default, table G0 is mapped to GL.) Some application programs send this sequence to restore "normal" characters after temporarily loading a special graphics set in table G0. This is satisfactory in Multinational mode. However, if your **Character set mode** is **National**, you probably don't want ASCII loaded. Your "normal" character set is one of the National Replacement Sets.

A special ZSTEM feature allows you to change the effect of **Esc (B** so that it loads the current NRC set into table G0. If you set the item **Default foreign font** on the Display Configuration screen to **National**, the escape sequence **Esc (B** will instead load your current NRC set, named in the item **Keyboard language** on the General Configuration screen. If you leave **Default foreign font** set to **ASCII**, the escape sequence **Esc (B** will always load the ASCII set into table G0.

Scroll

ZSTEM accurately represents the scrolling functions of a VT terminal including smooth scrolling and scrolling regions. In addition, ZSTEM has a read-only item **Hold Screen** on the Display Configuration screen that emulates the Hold Screen indicator on a VT terminal. The following sections tell you how to customize ZSTEM's scrolling functions.

Smooth Scroll

Item **Smooth scroll** on the Display Configuration screen controls how fast lines appear on the monitor when it scrolls up or down. If this item is set to **N**, lines appear as fast as they are received (jump scroll). If set to **Y**, lines appear smoothly and more slowly.

The rate at which lines appear in smooth scroll mode is controlled by the item **Smooth scroll delay** on the Display Configuration screen. You can set the delay to 0 through 255; a lower number produces a faster scroll. The default value is 20.

Software Scroll

Most display adapters are capable of scrolling your display using the adapter itself; this is called hardware scroll. Some adapters, however, do not hardware scroll properly; these include: the IBM PS/2 MCGA, all 128K EGAs, some non-standard adapters, and some laptop portables with liquid crystal displays.

For these adapters, ZSTEM provides a software scroll option. However, software scroll is slower and cannot perform a true smooth scroll. If you have problems in which the cursor loses its place, or part of the screen becomes garbled or blank after

scrolling, try software scroll. If ZSTEM is able to detect these problems, it will automatically switch to software scroll.

When you enable the terminal status line, the main portion of the screen (everything that is not the status line) is implemented as a large region. This affects the performance of different scrolling methods.

The scrolling method used for your screen or a region of your screen is controlled by the item **Software scroll** on the Display Configuration screen. It can have the following values:

No This value attempts the fastest scrolling method:
If the screen is not divided into regions, it is hardware-scrolled.
If a small region exists, it is software-scrolled.
If a large region exists, the entire screen is hardware-scrolled; then the small area outside the large region is software-scrolled in reverse. This may produce an annoying flicker.

Region This is the default value. This value attempts the best visual effect:
If the screen is not divided into regions, it is hardware-scrolled.
If a region of any size exists, it is software-scrolled.

Yes All scrolling is software. Choose this value if your display adapter cannot hardware-scroll reliably.

You can also force software scroll if you include the command line switch S when you invoke ZSTEM. You can use the switch F to cancel software scroll.

Recalling Previous Text

ZSTEM allows you to recall previously displayed text by holding the text that scrolls off the screen in a window back buffer. When you change between 80-column and 132-column format, the existing text is saved in this buffer.

To look back at previously displayed text:

- At the "ZSTEM?" prompt, type **WINDOW** and press RETURN. You can shorten this to **WI**.
- At the prompt:

  ```
  Window PgUp, PgDn, or arrows...
  ```

  you can press the following keys:

UP ARROW	back one line
DOWN ARROW	ahead one line
PG UP	back one page
PG DN	ahead one page

- When you have finished viewing, press RETURN twice to restore the original screen.

The number of lines of text available in the window back buffer depends on the item **Window back buffer request** on the Display Configuration screen. If this item is set to the default value **Min**, the buffer size is 17K. This holds 69 lines of 80 column text, or 43 lines of 132 column text. If this item is set to **Max**, ZSTEM will try to allocate 48K; approximately 200 lines of 80 column text, or 120 lines of 132 column text.

Blanking the Screen

ZSTEM allows you to "blank" or clear your screen, or a portion of your screen, under the conditions described below.

Screen Saver

ZSTEM has a screen-saver feature that blanks the screen after a period of inactivity. The screen is restored when you press any key, or when characters are received from your host. The item **CRT saver timeout** on the Display Configuration screen sets the period of inactivity, in minutes, after which ZSTEM will blank the screen. Its range is 1 to 99 minutes. The default is 5 minutes. The screen-saver does not blank if ZSTEM is left in command mode.

The item **CRT saver** lets you choose whether you want to disable this feature, blank the screen completely, or display a moving pattern which will remind you that ZSTEM is still running. Choose one of **Disabled**, **Blank** or **Pattern**. **Blank** is the default.

Requesting Immediate Blank

ZSTEM allows you to temporarily blank the entire screen. The contents are not lost, and will be re-displayed when you press any key. To immediately blank the screen:

- At the "ZSTEM?" prompt, type **VIDEO** and press RETURN. You can shorten this to **VID**.
- At the prompt:

```
Emulation video (Y):
```

  press B and RETURN.

Display

The screen immediately blanks. The screen may remain completely blank, or it may show the moving pattern described above. This depends on whether the **CRT saver** item is set to the value **Blank** or **Pattern**. To restore the display, press any key.

Blank Incoming Characters

You may want to temporarily blank any further output to the screen. This could be done in a softkey program to hide sign-on and password exchanges with the host.

To temporarily blank screen output:

- At the "ZSTEM?" prompt, type **VIDEO** and press RETURN.
- At the prompt:

  ```
  Emulation video (Y):
  ```

  press N and RETURN

ZSTEM leaves command mode. All received characters which would normally be displayed are converted to blanks; the cursor moves as expected.

To restore normal operation:

- At the "ZSTEM?" prompt, type **VIDEO** and press RETURN.
- At the prompt:

  ```
  Emulation video (N):
  ```

  press Y and RETURN

Conditional Clear on RUN, SHELL

ZSTEM normally runs your video adapter in its graphics mode. Many text applications, however, expect your video adapter to be in its text mode. When you give the ZSTEM RUN or SHELL command to run system commands or applications, you need to ensure that your adapter is running in the proper mode. If your adapter is not in the proper mode, the screen will become confused. ZSTEM always returns your adapter to its previous mode when it returns to emulation.

The value of the item **Reset screen on DOS call** on the Display Configuration screen determines whether or not ZSTEM will clear the screen and put your adapter in text mode when it runs an operating system command. The value is either:

Y the screen is cleared, changed to text mode and a cursor is displayed, or

N the adapter remains in graphics mode during calls to the operating system, and the screen is not cleared.

Clear Display

You may wish to immediately clear the emulation screen. To do this, you must do the following:

- On the General Configuration screen, select the item **Clear**.
- Press SPACE to highlight the value **Display**.
- Press RETURN to clear the emulator display.
- Press RETURN twice more to get out of command mode.

Other Options

Status Line

ZSTEM provides the standard DEC terminal status line. This status line occupies the last line of the screen, sharing that space with the ZSTEM command line. It is controlled by the usual ANSI control sequences, or by item **Status display**.

None: No status line is displayed

Indicator: The status line shows the cursor position (row,column), state of the printer (On, AutoPrint, Controller or Busy), modem status (DSR and DCD), hold indicator, and compose indicator.

Host writable: The host can write to the status line using the DEC-defined ANSI control sequences.

Monitor Background

You may wish to change ZSTEM's default display of white text on a dark background, to dark text on a white background. You can easily do this by setting the item **Screen** on the Display Configuration screen to **Reverse**. This will exchange the normal foreground and background color indexes (from index **7** on **0**, to index **0** on 7). Another way to do this would be to change the actual colors assigned to the foreground and background color indexes.

Cursor Style

ZSTEM lets you choose the text cursor style you wish to display in both emulation and command mode. To change the style, set the item **Cursor Style** on the Display Configuration Screen to one of **Underline**, **Block** or **None**. ZSTEM's default value is **Underline**.

Auto wrap

The item **Auto wrap mode** on the Display Configuration screen determines whether or not characters will wrap to the next line when you reach the last column of your display. If you set this item to **Y**, characters will wrap around to the next line. The default value of this item is **N**.

Transparent Controls

At some point, you may wish to see every character that is being sent to your terminal, including control characters that are not normally displayed. This can be a very useful aid when debugging programs. Setting the item **Transparent mode** on the Display Configuration screen to **Y** tells ZSTEM to display all received characters by name, and not to act upon them. Character names are taken from the C0 and C1 code tables.

For example, the ASCII BEL code (CTRL-G) will appear as "<BEL>" and the terminal bell will not sound.

Chapter

7

Keyboard

Introduction

The VT320 terminal uses the DEC-designed keyboard called the LK201. The LK201 has 105 keys, and is available in both a standard and a gold model. This manual uses the term *VT keyboard* to refer to the LK201 keyboard.

Unlike the VT keyboard, there are many different styles of PC keyboards. The original IBM PC/XT keyboard has 83 keys. The newer IBM Enhanced Keyboard has 101 keys and is quite similar to the VT keyboard. The PowerStation keyboard from KEA Systems Ltd. has 105 keys positioned exactly the same as the LK201.

This chapter tells you how to find all of the VT keys on your PC keyboard. It tells you how to use ZSTEM to select a keyboard language. It also tells you how to change or remap the keys to suit your personal preference.

Chapter 13, "Operating System Environment," describes the effects of the operating system on keyboard behaviour.

Most of the configuration items referred to in this chapter are on the Keyboard Configuration screen. To access this screen, at the "ZSTEM?" prompt, press C, SPACE, B, and RETURN.

Layout of the VT300 Keys on Your Keyboard

The LK201, or VT keyboard, has more keys than most PC keyboards. Many keys are also marked differently.

Figures 7.1 through 7.6 give you a detailed description of how to locate VT keyboard keys on the popular PC keyboards. The key names on the diagrams are the names of VT keys; their positions on the diagrams shows you their position on your keyboard.

ZSTEM normally handles keyboard input directly. If you are running any Terminate and Stay Resident (TSR) programs, you may experience keyboard interference. For this reason, ZSTEM has two other methods of handling keyboard input. For further details, refer to Chapter 13, "Operating System Environment."

Choosing a Keyboard Type

The installation procedure allows you to choose the type of keyboard, or keyboard arrangement, that corresponds to your PC keyboard. You can also change this arrangement by changing the value of the item **Type** on the Keyboard Configuration screen. ZSTEM then uses the mapping that suits the keyboard you have chosen.

Details on some specific keys are found in the "Special Keys" section at the end of this chapter.

Figures 7.1 through 7.6 show ZSTEM's supplied keyboard mappings. In these figures, the keys are labelled with the VT functions used during emulation, not the native PC functions. Note: if you are using the B command line switch (BIOS keyboard handling) there will be some differences. See Chapter 13 for more details.

The possible values for keyboard **Type** are:

XT IBM PC/XT or equivalent. Figure 7.1.

AT IBM PC/AT or equivalent. Figure 7.2.

Enhanced

IBM Enhanced Keyboard or equivalent. Figure 7.3. This keyboard is the 101 or 102 key keyboard used on enhanced XT, AT and PS/2 systems. Note: the six editing keys are arranged so that the PC keytop markings correspond to the VT functions they perform. (Also see "Alternative Enhanced Layout" below.)

PowerStation

KEA Systems' VT300-style keyboard, described in the section, "The PowerStation Keyboard" and Figure 7.4.

ZPC Zenith PC. Figure 7.5.

ZAT Zenith AT. Figure 7.6.

LK250 Digital Equipment Corporation's LK201-like keyboard that functions with some PCs. If you use this keyboard on XT class machines, it is necessary to press ALT+F17 to toggle into and out of VT mode. The "special" indicator is turned off when in VT mode.

STD An arrangement which preserves the native PC functions engraved on the keycaps. Use this with any type of keyboard. This provides most VT keyboard functions but does not preempt any PC keys that are marked with meaningful VT functions.

The F1 through F10 keys are arranged as for the IBM PC/XT both alone and with SHIFT, CTRL and ALT (Figure 7.1).

F11 and F12 have no specific VT mapping, but you can assign a softkey definition.

The keypad number keys function as VT keypad numbers, or as the VT editing keys: FIND, PREV SCRN, SELECT, NEXT SCRN, INSERT HERE, REMOVE depending on the state of NUMLOCK.

Other keypad keys, including SCROLL LOCK, COMMA, PLUS, MINUS retain their marked function. Keys such as COMMA which exist on a real VT keypad generate both the marked function and, when the keypad is in application keypad mode, the special VT code sequence.

Alternative Enhanced Layout

ZSTEM offers an alternative mapping of the editing keys on the Enhanced keyboard. In this mapping, the six editing keys are mapped to the position they hold on a VT keyboard, regardless of the PC keytop markings. Load the softkey definition IBMX2PAD.KEY. If this file is in your default ZSTEM directory, you could load it by typing at the "ZSTEM?" prompt: **GET C:\ZSTEM\IBMX2PAD.KEY M**. In the item

Type, select **Enhanced**. The six keys of the editing keypad will now be as in figure 7.4; the rest of the keyboard as in figure 7.3.

The PowerStation Keyboard

The PowerStation is a keyboard that looks and feels like the keyboard of a real VT terminal. It is available from KEA Systems Ltd. The PowerStation keyboard plugs into virtually any PC, XT, AT, PS/2, AT&T, Olivetti or compatible system, replacing the regular keyboard. The PowerStation is available in two models: standard and gold (with additional WPS gold key labels). Replacement keytop sets are available for most languages. The PowerStation keyboard has 105 keys positioned and spaced as on a real VT terminal. When it is used with ZSTEM, all keys function as on a VT terminal. (The only exception is the DATA/TALK key which is marked and used as ESC). All VT function labelling is in black on the key tops. Where the native PC functions of the keys are different from the VT functions, the PC functions are labelled in blue on the key fronts.

Generally, the PowerStation changes its mode automatically: in native PC mode it functions as an Enhanced keyboard; when you run ZSTEM it functions as a VT keyboard. However, on XT-class PCs, you must change its mode when you run ZSTEM and again when you exit from ZSTEM. You can toggle the mode by pressing CTRL+HOLD SCREEN. A simple test on any PC will reveal which mode the keyboard is in. Press the LOCK key. If the "Lock" indicator glows green, the keyboard is in PC mode; if it glows red, VT mode.

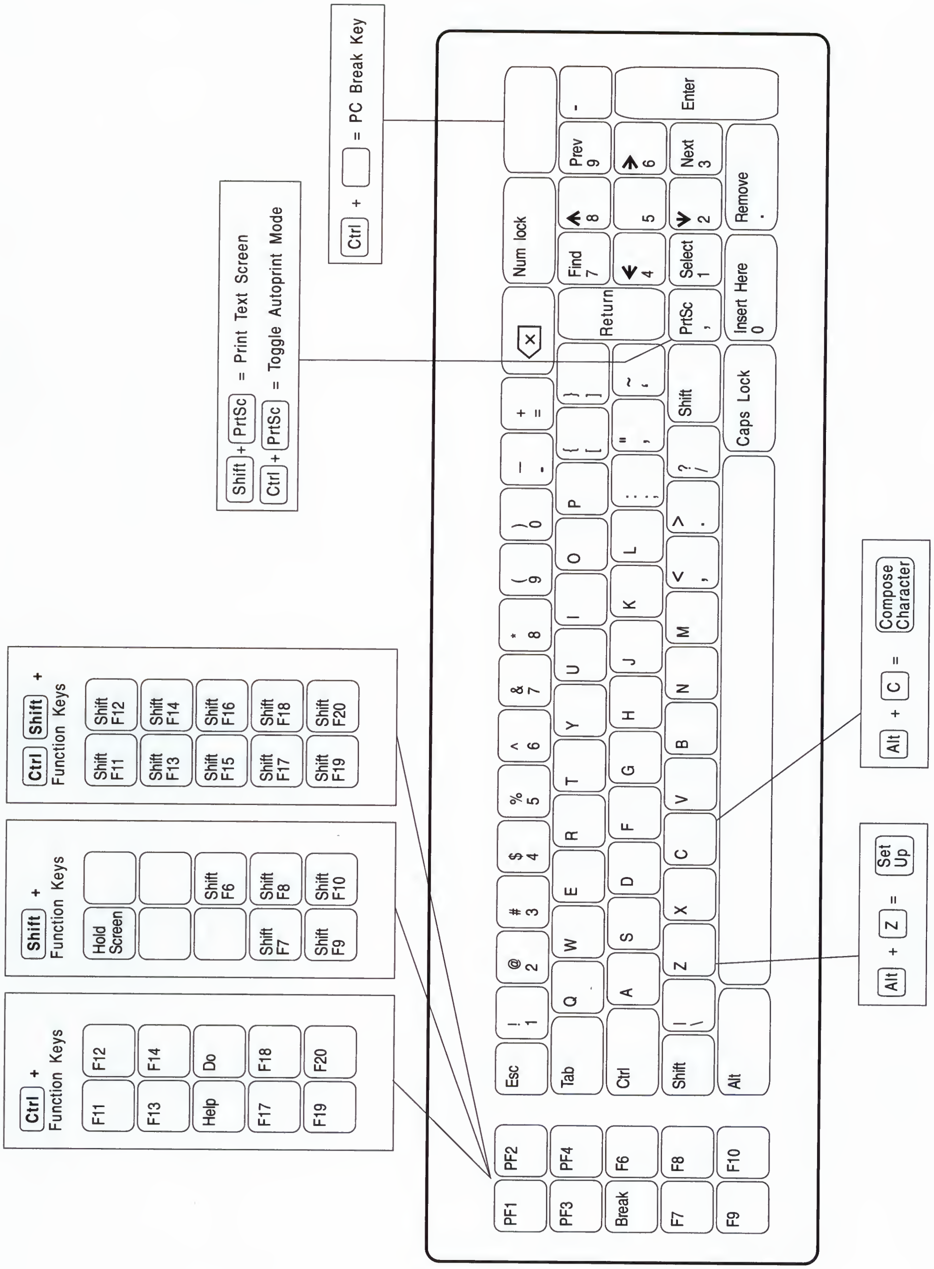


Figure 7.1. VT terminal functions on the IBM PC/XT keyboard

Keyboard

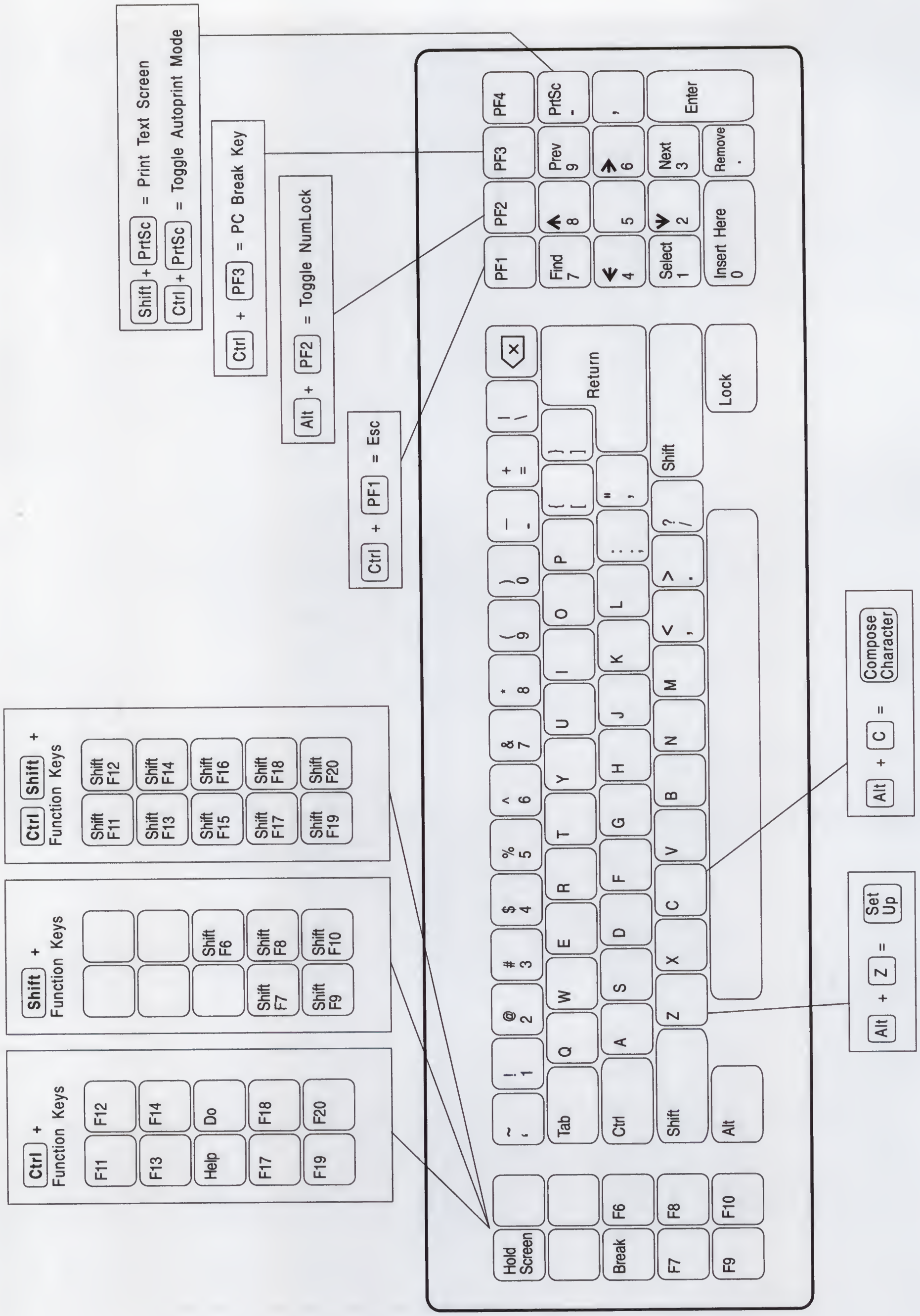


Figure 7.2. VT terminal functions on the IBM PC/AT keyboard

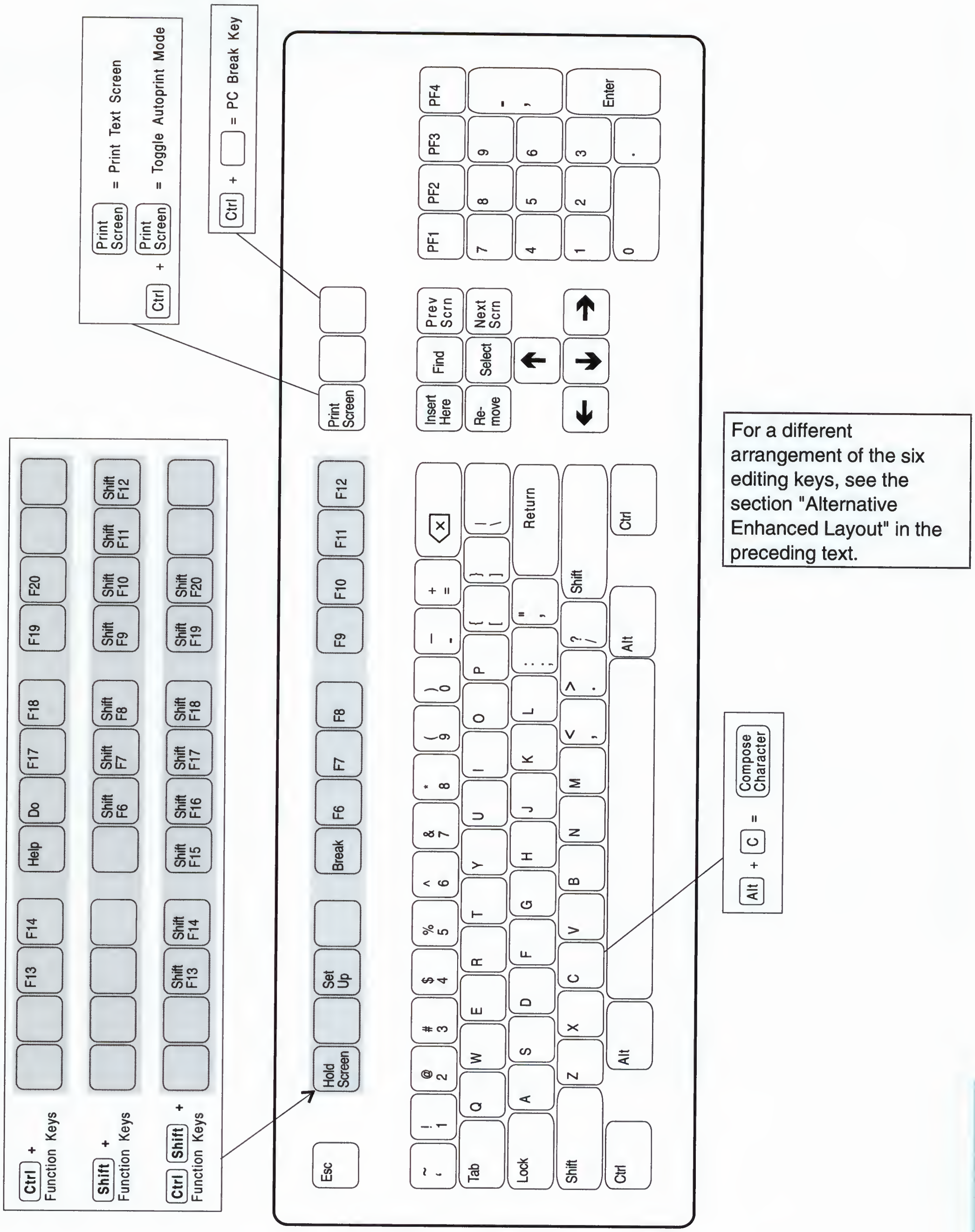


Figure 7.3. VT terminal functions on the IBM Enhanced keyboard

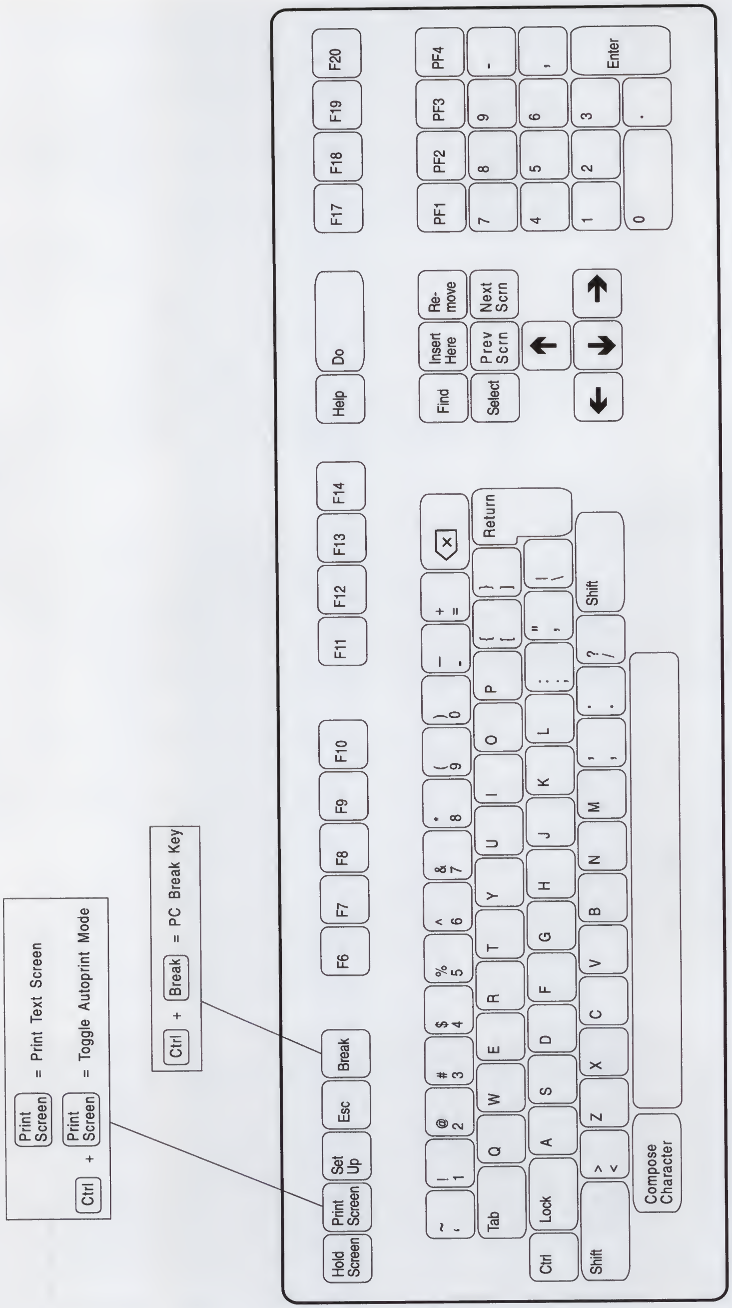


Figure 7.4. VT terminal functions on the KEA Systems PowerStation keyboard

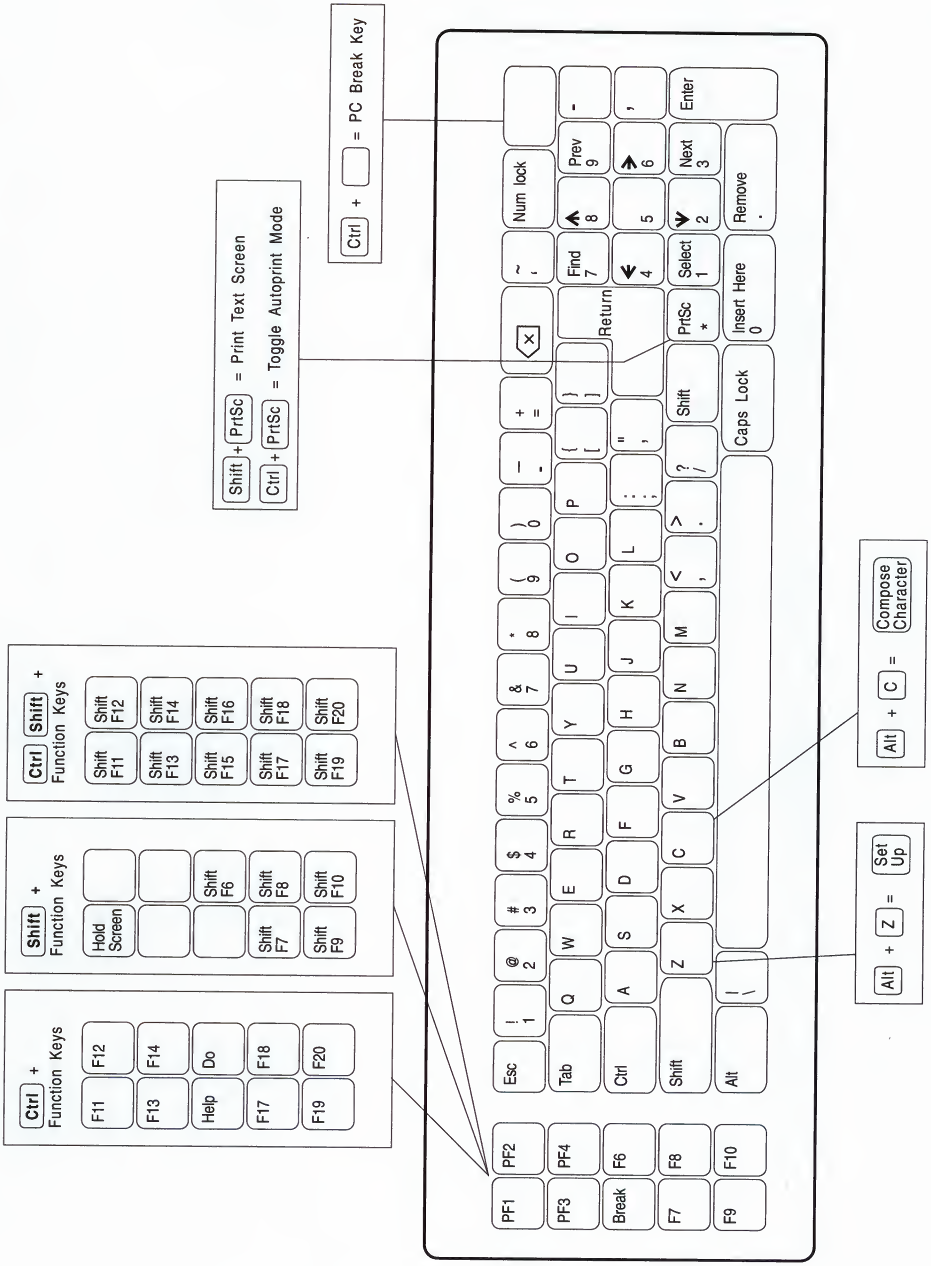


Figure 7.5. VT terminal functions on the Zenith PC keyboard

Keyboard

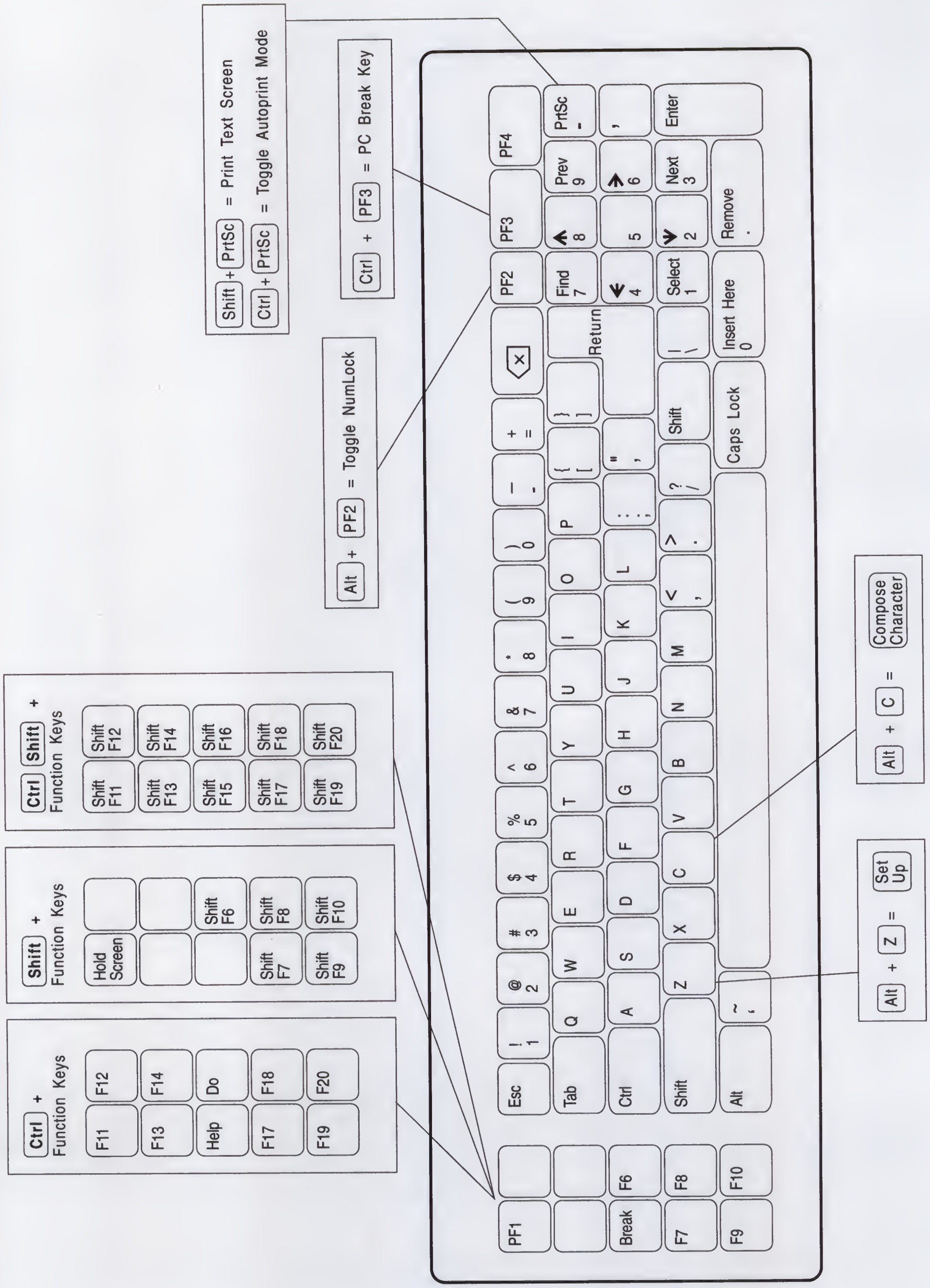


Figure 7.6. VT terminal functions on the Zenith AT keyboard

Keyboard

Help Screens

ZSTEM comes with several keyboard layout help screens. You can display these keyboard layouts while you are running an application. The screens are actually softkey definition files that use ZSTEM's Local Help mode. You can read more about softkeys in Chapter 11.

There are help screens for general VT terminal operation, for using DEC's EDT editor, and for using WPS. To make a help screen available:

- Refer to Table 7.1 and copy the appropriate softkey file from the ZSTEM distribution diskette to your ZSTEM directory. How to extract files from compressed "ZIP" collections is described in Chapter 2.
- Use the GET command to load the file into ZSTEM. For example, **GET C:\ZSTEM\IBMPCHLP.KEY M**
- If you want to be able to display your keyboard help screen the next time you run ZSTEM, you must save the configuration or entire program. See "Saving Your Options" in Chapter 3 for more information on saving your options, including softkeys.

At any time, to display the help screen you have loaded, press the key given in Table 7.1.

TABLE 7.1
Filenames of Keyboard Help Screens

	For general use	EDT layout	WPS layout
Keyboard Type:			
XT	IBMPCHLP.KEY	IBMPCHLP.EDT	IBMPCHLP.WPS
AT	IBMATHLP.KEY	IBMATHLP.EDT	IBMATHLP.WPS
Enhanced (as marked)	IBMXKHLP.KEY	IBMXKHLP.EDT	IBMXKHLP.WPS
Enhanced (VT layout)	IBMX2HLP.KEY	IBMX2HLP.EDT	-
PowerStation	(not required)	(use EDT's own help)	(not required)
ZPC	ZPCHLP.KEY	ZPCHLP.EDT	ZPCHLP.WPS
ZAT	ZATHLP.KEY	ZATHLP.EDT	ZATHLP.WPS
Found in compressed file:	KEY.ZIP	EDT.ZIP	WPS.ZIP
To show this screen, press:	ALT+K	ALT+E	ALT+W

Keyboard Remapping

ZSTEM supplies default keyboard mapping for all of the popular PC keyboards. You can customize these mappings or create your own mappings with ZSTEM's softkey programming capability. Also included are mapping files for two popular applications.

A detailed description of softkey programming is found in Chapter 11. The following are some example keyboard re-mappings which you could do. Remember, if you do not save your softkeys, ZSTEM will not remember your remapping the next time it is run. See Chapter 3 for more information on saving your configuration.

Example 1

The BACKSPACE key normally sends ASCII DEL. The SHIFT+BACKSPACE key normally sends ASCII BS. In a UNIX environment, you may want unshifted BACKSPACE to send ASCII BS. The following softkey definition changes BACKSPACE so that it sends ASCII BS.

`ZSTEM? so`

`Select key...` BACKSPACE

ZSTEM then displays the Softkey Definition screen. Press SHIFT+BACKSPACE which ZSTEM will echo as <back space>. Then press ALT+T to terminate programming.

From now on, when you press BACKSPACE it will send ASCII BS!

Example 2

You may want to easily generate the British currency character without using the entire British keyboard layout. The code for £ is 163 in the DEC-MCS set (or 156 in the IBM Graphics set). Your keyboard can generate any code if you hold ALT as you press the code value on the numeric keypad. Assuming that your supplemental character set (range 128 to 255) is the default **DEC-MCS**, the following softkey definition will assign the DEC-MCS code for £ to CTRL+4.

`ZSTEM? so`

`Select key...` CTRL+4

ZSTEM displays the Softkey Definition screen. Press ALT and hold it as you press 1, 6, 3 on the numeric keypad, which ZSTEM will echo as £. Then press ALT+T to terminate programming.

You can now easily generate the £ character by pressing CTRL+4.

Example 3

You may want to output your VAX account name in a single keystroke. This would then simplify your login procedure. The following softkey definition makes SHIFT+F6 generate the account name CHRISTIANSEN followed by CR.

> **ZSTEM? so**
>
> **Select key...** SHIFT+F6
>
> ZSTEM displays the Softkey Definition screen. Type **CHRISTIANSEN** and press RETURN. Then press ALT+T to terminate programming.

You could similarly assign your password to another key. More complex softkey definitions can handle the entire login procedure.

These brief softkey programs perform as remapping files. When you press the key, the program is executed, sending a different code or string of codes to your host.

Remapping for Specific Applications

The distribution disk contains keyboard mapping files especially prepared for two popular applications. These are for using the VAX version of WordPerfect version 5.0, or the VAX version of Lotus 1-2-3 with ZSTEM. With these mapping files, you can continue to use the same keystrokes when you run either the VAX version, or the familiar PC version. The mapping files are compressed in the ZIP files WP.ZIP and 123.ZIP. Each has a README file with more information.

Character Sets

The actual codes that your keyboard sends to your host depend on both the character set you are using, and the keyboard language you have selected.

By factory default, the DEC Multinational Character Set (MCS) is mapped into the code table of a VT terminal. The 7-bit compatible, or left half of the table contains the ASCII character set. The 8-bit compatible, or right half of the table contains the DEC Supplemental Graphics Set. The VT terminal allows you to substitute either DEC-defined or application-defined character sets for the default Multinational Character Set. ZSTEM can use all of these character sets.

The keyboard language you select determines how each key-press is interpreted as different characters and symbols. You are not restricted to the actual physical markings on your keyboard. For example, you can use a standard North American keyboard to output French characters.

North American Keyboard

English-speaking North Americans have probably chosen the North American keyboard during the install procedure. This has set the value of **Keyboard language** on the General Configuration screen to **North American**, and the value of **Character set mode** on the General Configuration screen to **Multinational**.

In Multinational mode, the regular ASCII set is mapped into the left half of the character table (GL 0 to 127); and a supplementary set is mapped into the right half of the character table (GR 128 to 255). You must choose the supplementary set which your host requires in the item **User Preferred Supplemental** on the General Configuration screen. (For more information see the section "Supplemental Sets" in Chapter 6.)

To send and receive codes in the right half of the character table, or the GR set, you need 8 bits of data. If you are using a serial port (COM1, COM2...), ensure that the item **Data bits** on the Session Configuration screen is set to **8**.

Other Keyboard Languages

International users should choose their appropriate keyboard language in ZSTEM's install procedure. Figures 7.7 and following, at the end of this chapter, show ZSTEM's international layouts on four popular PC keyboards.

Most users will choose the language which matches the existing markings on their keycaps, but this is not necessary. You can choose any language on any keyboard; even if your keyboard is "North American". In this way you can easily generate international characters on a North American keyboard.

The installation procedure will determine the value of the item **Keyboard language** on the General Configuration screen. **Keyboard language** can be: **British, Flemish, Canadian(French), Danish, Finnish, German, Dutch, Italian, Swiss(French), Swiss(German), Swedish, Norwegian, French/Belgian, Spanish, Portuguese**, or **Icelandic**.

There are two major character set translation modes; your host determines which one you should use. You should set the item **Character set mode** on the General Configuration screen to **Multinational** or **National**. If you are not sure which mode to use, you should see your system manager.

Your choice of character set mode will not visibly affect your keyboard layout. The actual codes sent by your keyboard, however, will change. Following is a basic description of the two major translation modes.

Multinational Mode

In Multinational mode, the regular ASCII set is mapped into the left half of the character table (GL 0 to 127); a supplementary set is mapped into the right half of the character table (GR 128 to 255). You must choose the supplementary set which your host requires in the item **User Preferred Supplemental** on the General Configuration screen. If you press or compose an accented or "international" character, a code from GR is sent. If you press or compose a keyboard character that isn't in the GL or GR, ZSTEM beeps. (For more information see the section "Supplemental Sets" in Chapter 6.)

To send and receive codes in the GR set, you need 8 bits of data. If you are using a serial port (COM1, COM2...) ensure that the item **Data bits** on the Session Configuration screen is set to **8**.

National Mode

In National mode, one of the National Replacement Character (NRC) sets is mapped into the left half of the character table (GL 0 to 127). The actual NRC set used is determined by the item **Keyboard language** on the General Configuration screen. Only 7 bits are used for character generation.

You must set **Keyboard language** to a value other than the default **North American**. Set it to either **British**, **Flemish**, **Canadian(French)**, **Danish**, **Finnish**, **German**, **Dutch**, **Italian**, **Swiss(French)**, **Swiss(German)**, **Swedish**, **Norwegian**, **French/Belgian**, **Spanish**, **Portuguese**, or **Icelandic**.

If you press (or compose) a keyboard character that isn't in the selected National character set, ZSTEM usually beeps and the character is discarded. However, if the item **Send ASCII in National mode** is set to **Y**, and that character exists in the ASCII table, the ASCII code will be sent.

Special Keys

This section gives a detailed description of some special PC and VT keys. The key descriptions have been arranged in alphabetical order.

Alt

The ALT key doesn't normally appear on a VT keyboard. Because of its extensive use in ZSTEM command mode and softkey programming, it has been included in all of the keyboard figures.

BackSpace

In ZSTEM, the BACKSPACE key sends the ASCII DEL code. SHIFT+BACKSPACE and CTRL+BACKSPACE send the ASCII BS code. If this is not appropriate for your host system, you can remap the BACKSPACE key with softkey programming.

Break

The following describes the difference between the PC Break key and a VT terminal's Break-to-Host signal.

PC Break Key

Pressing the key combination CTRL+BREAK will interrupt most ZSTEM processes. You can cancel a local print function, an executing softkey, a softkey being programmed, or an ongoing file transfer. This is a ZSTEM function, not a VT key. The function is identified as "PC Break Key" on the keyboard figures.

Break-to-Host Signal

The VT terminal Break-to-Host Signal sends a 300 msec break signal to the host. This is an actual VT key. On the keyboard figures in the manual, the key appears as "Break"; on most PC keyboards, it is marked F5.

CapsLock

The item **Lock key** on the Keyboard Configuration screen controls whether CAPS LOCK affects only the alphabetic keys (**Caps Lock**), or both the alphabetic keys and the ASCII punctuation keys (**Shift Lock**).

The item **Caps lock/shift interaction** on the Keyboard Configuration screen determines if SHIFT and CAPS LOCK work independently. If this item is set to **VT**, SHIFT functions independently of CAPS LOCK. If this item is set to **IBMPC**, and CAPS LOCK is on, the sense of SHIFT is reversed -- it produces lower case.

Compose

The VT keyboard uses the compose character key to generate characters that are not on the physical keyboard. You press the Compose character key followed by the appropriate compose sequence. For example, a compose sequence could be used to generate an O umlaut on a North American keyboard. ZSTEM supports both three-stroke and two-stroke sequences.

ALT+C emulates the VT Compose Character key on PC keyboards. (The PowerStation keyboard from KEA Systems has an actual COMPOSE key.)

Note: If you use Compose sequences to generate 8-bit characters from the GR set, you must be in an eight-bit environment. That is, the item **Data bits** on the Session Configuration screen must be **8**, and the item **Terminal mode** on the General Configuration screen must be set to **VT300/7-bit** or **VT300/8-bit**.

Cursor Keys

The item **Cursor keys** on the Keyboard Configuration screen determines whether the four cursor control keys send normal ANSI cursor control sequences (**Normal**), or application control functions (**Application**).

The cursor key mode is usually controlled by the host.

Editing Keys

The editing keys are the six VT keys labelled FIND, INSERT HERE, REMOVE, SELECT, PREV SCRN and NEXT SCRN. On older PC keyboards that do not have editing keys, ZSTEM maps them to the PC key that has the closest equivalent function. On the enhanced and PowerStation keyboards, they are mapped to the same six editing keys. See figures 7.1 through 7.6 for the exact mapping. If you are using the IBM enhanced keyboard, you have a choice of how the six keys are arranged.

Function Keys

The VT keyboard has more function keys than any of the popular PC keyboards. For this reason, the extra function keys must be mapped to different PC key combinations. Figures 7.1 through 7.6 give a detailed description of how to enter these keys.

Numeric Keypad

Numlock

On PC keyboards, the numeric keypad can be used to enter either numbers or editing keys; the state of the NUMLOCK key determines which. This key was originally needed for the older XT and AT keyboards that did not have separate editing keys.

If you are using ZSTEM with the enhanced or PowerStation keyboard, NUMLOCK has no effect on the state of the numeric keypad. The keypad is always in numeric mode, just like a VT keyboard.

If you are using an older PC/XT/AT keyboard without an editing keypad, the state of NUMLOCK is significant. The PC and AT keyboard diagrams assume that Numlock is on, and that the numeric keypad will output numbers in its unshifted state. To ensure that your PC/XT/AT keyboard always agrees with the diagrams, you can use the N switch to force your keypad into numeric mode when ZSTEM is started. This switch should not be used with the PowerStation, Enhanced or LK250 keyboards. You can cancel this switch with U. You can also use SHIFT to temporarily reverse the state of Numlock.

Note: You should NOT use N on IBM PC/XT compatible machines having a NumLock light controlled by the keyboard processor. If you do, the light may not be synchronized with the current keypad state.

Keypad Mode

The item **Keypad mode** on the Keyboard Configuration screen determines whether the "numbers" on the numeric keypad generate ASCII numbers (**Numeric**), or control functions (**Application**). Keypad mode is usually controlled by the host.

Repeat

The item **Auto repeat** on the Keyboard Configuration screen controls whether keys will repeatedly transmit the same character when you hold the key down for a period of time.

Return

The item **New line mode** on the General Configuration screen is a standard VT terminal feature:

If this item is set to **N**, a received LF, FF, or VT code will move the cursor to the next line in the same column. Pressing RETURN sends a CR code only.

If this item is set to **Y**, a received LF, FF, or VT code will move the cursor to the first column of the next line. Pressing RETURN sends CR and LF codes.

The item **Return sends <CR><LF>** on the Keyboard Configuration screen is not a standard VT feature. It controls whether RETURN sends CR only, or both CR and LF codes. This item does not affect received codes.

Pressing CTRL+RETURN sends a LF code.

Tab

The item **Tab stops** on the Keyboard Configuration screen allows you to set the tab stops you want on a line. By default, the first tab is in column 9 and a tab occurs every 8 columns thereafter. You can clear all tabs by choosing the value **Clear-All** or you can restore the tabs to their default positions by choosing the value **8-Column**.

To set and clear tabs at any column:

- On the Keyboard Configuration screen, select the item **Tab stops**, press SPACE to choose the value **Set** and press RETURN.
- Move the cursor along the page ruler by pressing TAB, SHIFT+TAB, RIGHT ARROW and LEFT ARROW. Where you want to set or clear a tab, press SPACE. The marker ^ indicates a tab at that point. Repeat this step to set and/or clear any number of tabs.

  You can also enter a number, *n*, from **1** to **9**. Doing this will clear all tabs to the right of the cursor, and set a tab every n positions to the right of the cursor.
- When you have set and cleared all the tabs you want, press RETURN.

User-Defined Keys (UDKs)

The VT terminal lets you define the shifted state of the 15 keys on the top row of the VT keyboard: F6 through F14, HELP, DO and F17 through F20. These are called User-Defined Keys (UDK). The control sequences to program these keys are given in Appendix B. After a UDK is defined, you can use it by pressing SHIFT with the Function key. ZSTEM allows you to define the UDKs the same way.

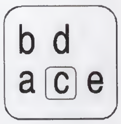
To stop the host from being able to alter the UDK definitions, set the item **User keys locked** on the General Configuration screen to **Y**.

National Keyboard Layouts

Figures 7.8 through 7.23 illustrate the different national keyboard layouts on the alpha-numeric portions of four popular keyboards:
the KEA PowerStation, the IBM Enhanced, the IBM AT, and the IBM XT keyboards.

Figure 7.7 shows you how to interpret the markings on individual keycaps in those diagrams.

In the following National layout figures, the position of each keytop character tells you how to obtain that character:



position a is the key alone
position b is SHIFT + key
position c is ALT + key
position d is ALT+SHIFT + key
position e is ALTGR + key or CTRL+ALT + key

Any character that is enclosed in a box (as position "c" in this example) means you can use that position as the first character in a 2-stroke compose sequence.

Figure 7.7. "Key" to following national keyboard layouts

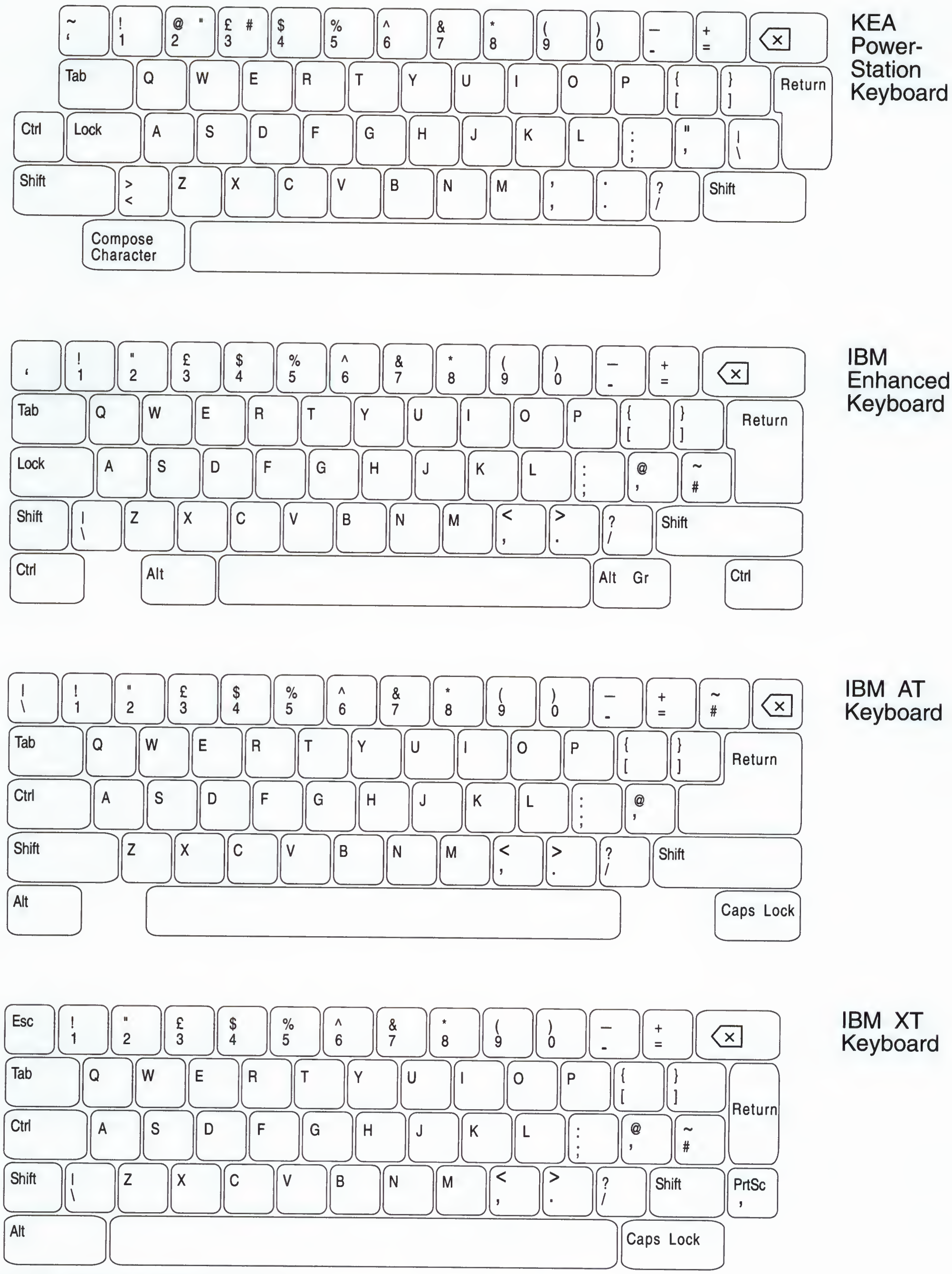
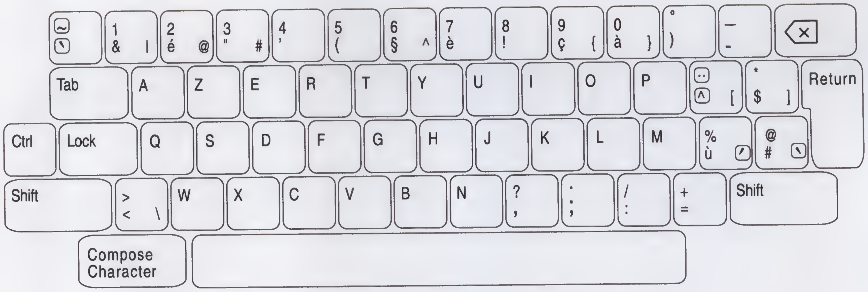
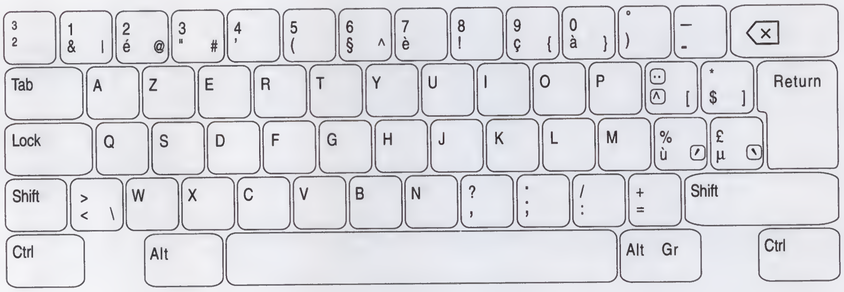


Figure 7.8. British keyboard layout

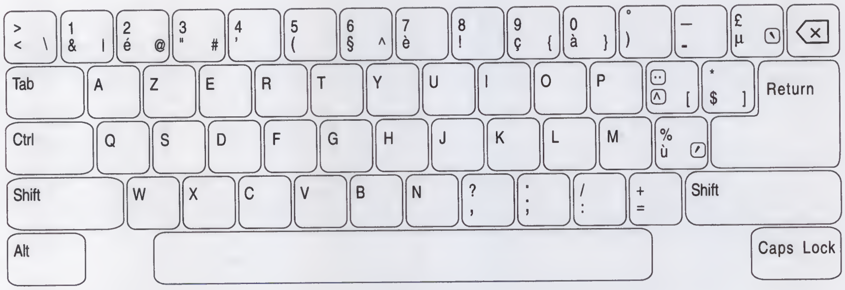
Keyboard



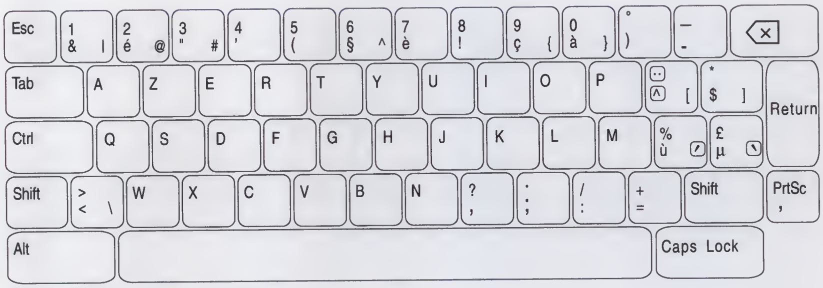
KEA Power-Station Keyboard



IBM Enhanced Keyboard



IBM AT Keyboard

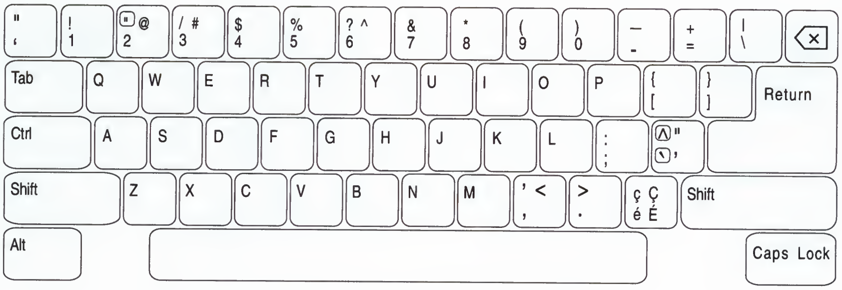


IBM XT Keyboard

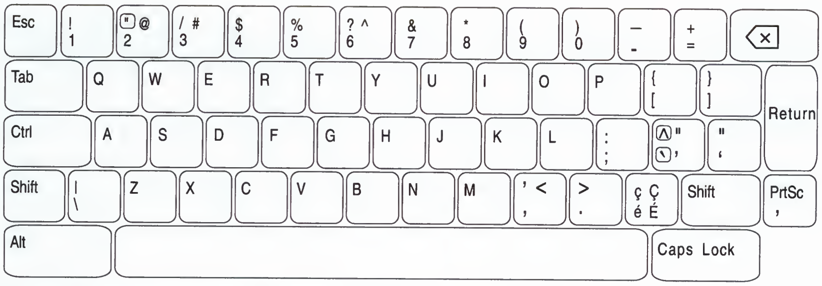
Figure 7.9. Flemish keyboard layout

KEA
Power-
Station
Keyboard

IBM
Enhanced
Keyboard



IBM AT
Keyboard



IBM XT
Keyboard

Figure 7.10. Canadian (French) keyboard layout

Keyboard

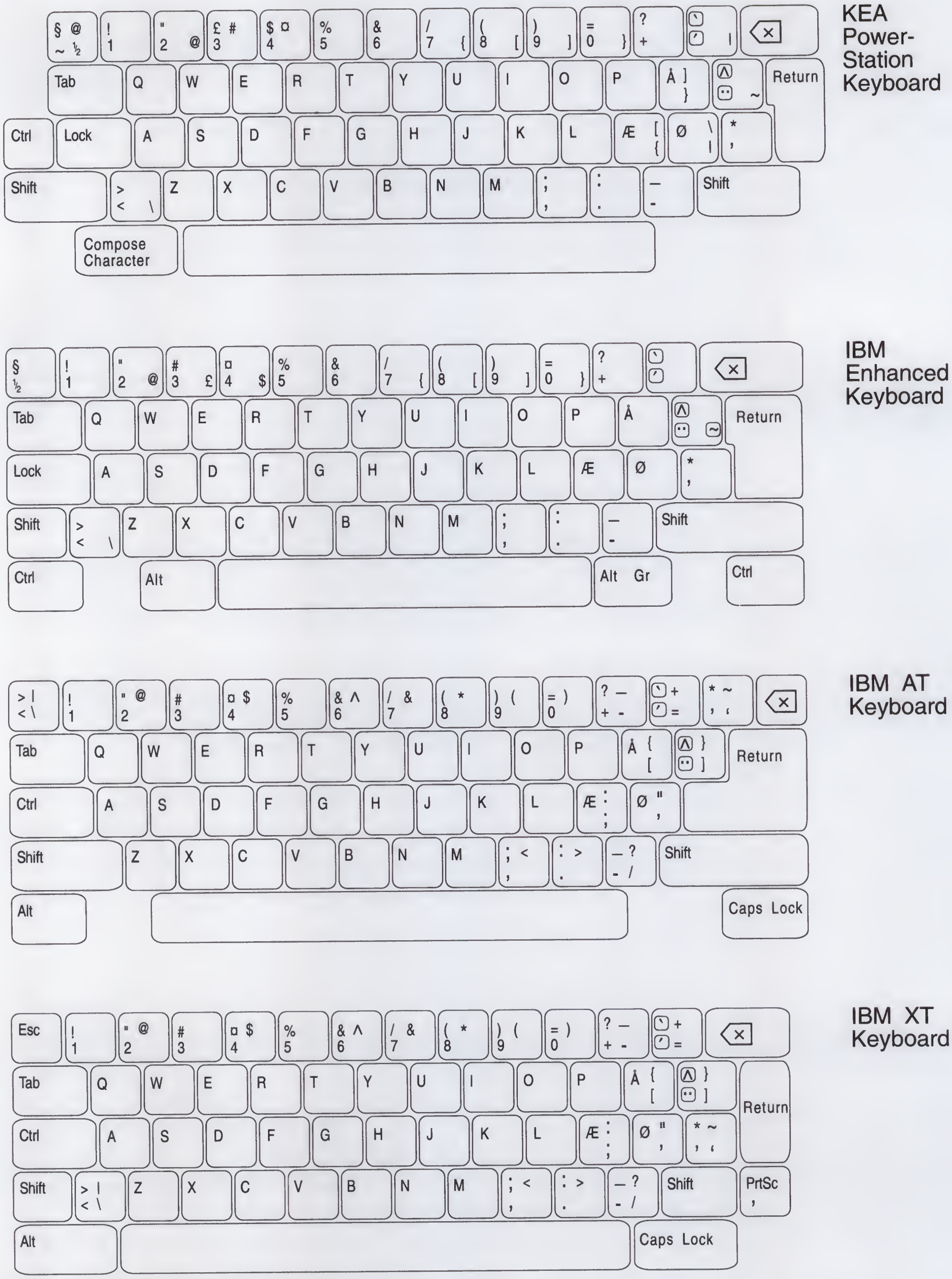


Figure 7.11. Danish keyboard layout

Keyboard

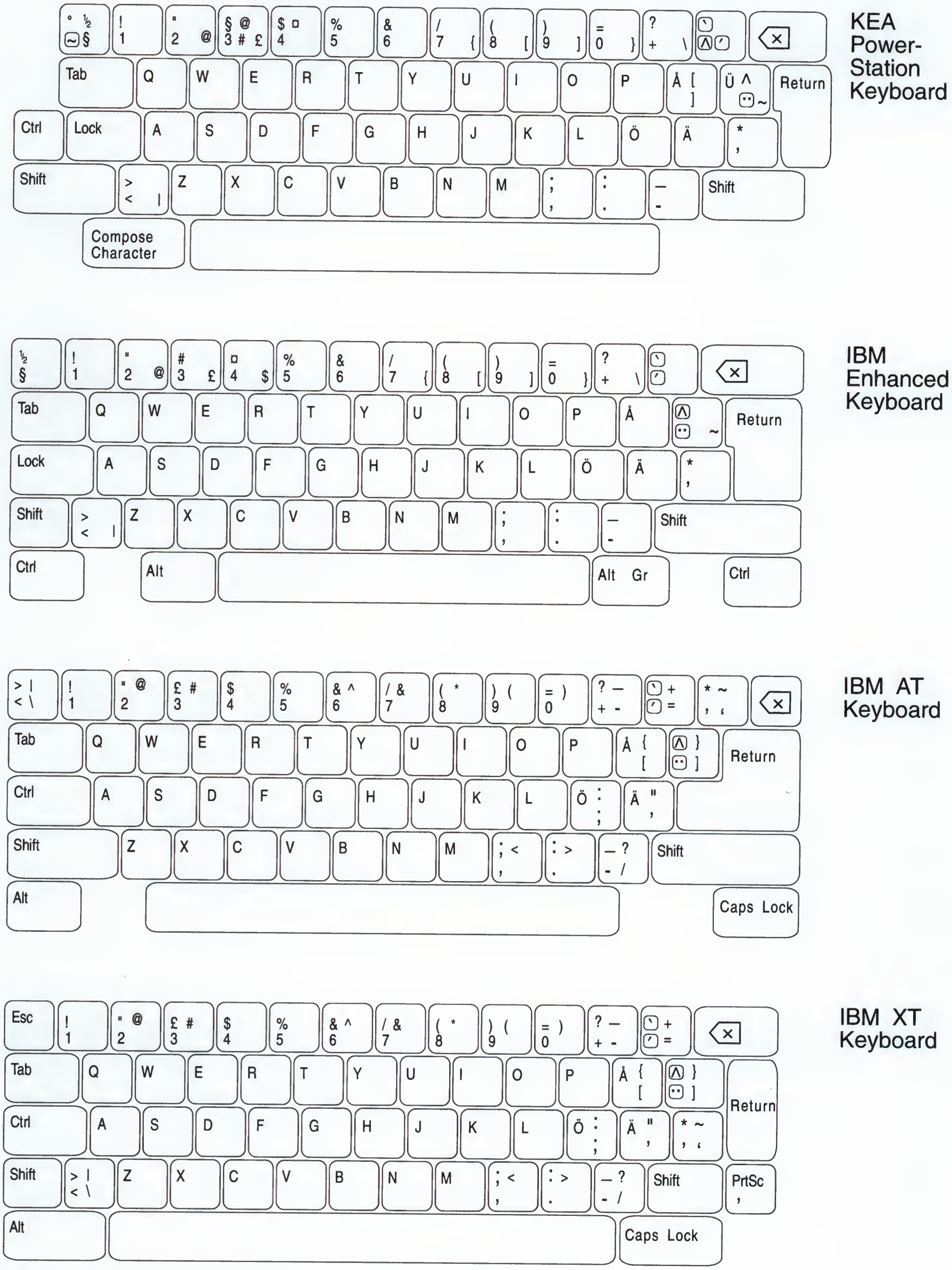
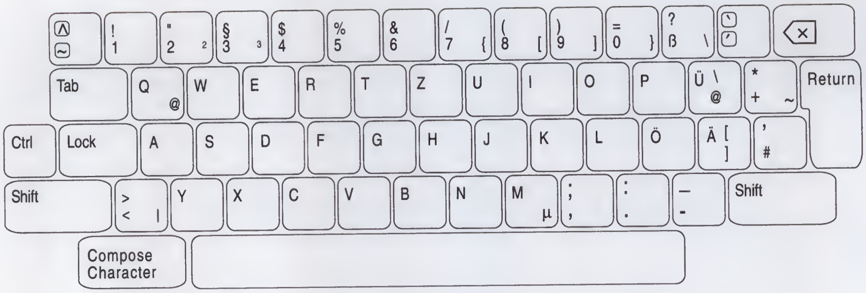
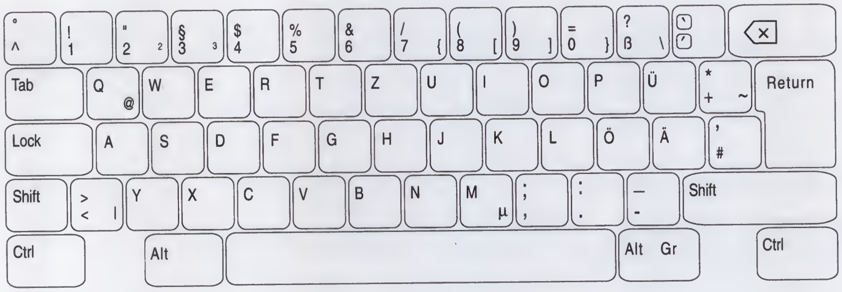


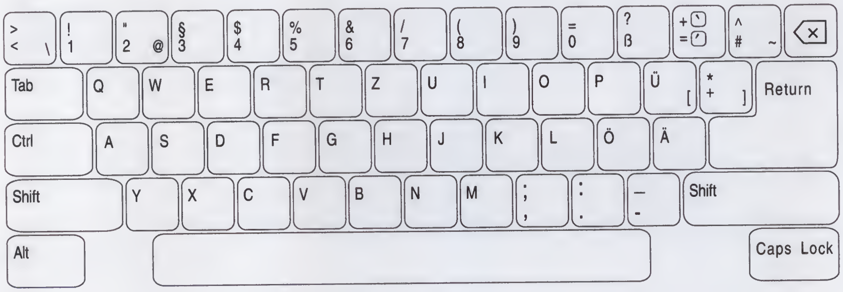
Figure 7.12. Finnish keyboard layout



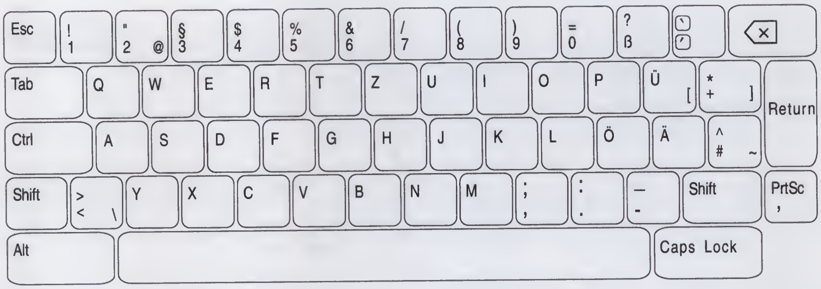
KEA Power-Station Keyboard



IBM Enhanced Keyboard



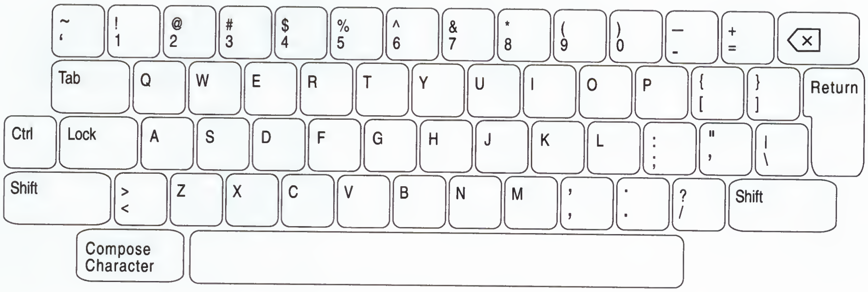
IBM AT Keyboard



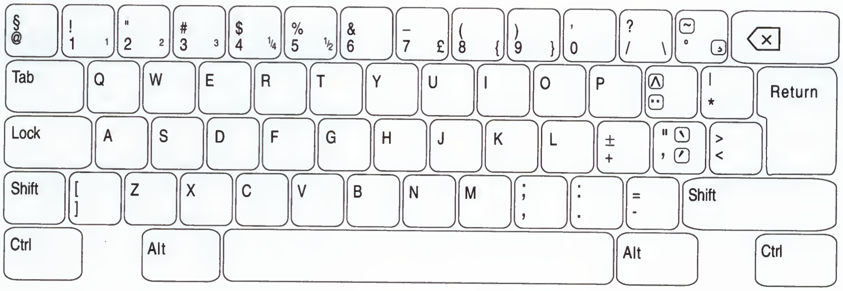
IBM XT Keyboard

Figure 7.13. German keyboard layout

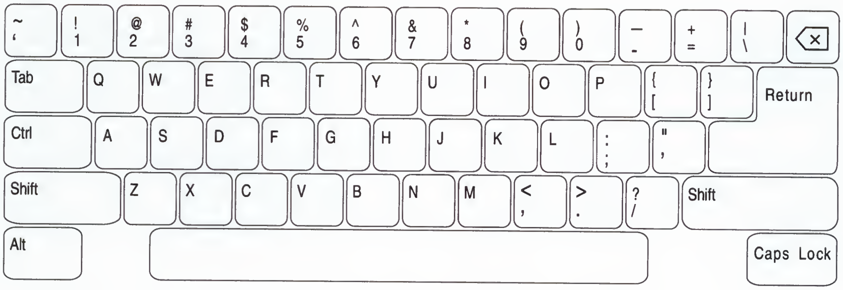
Keyboard



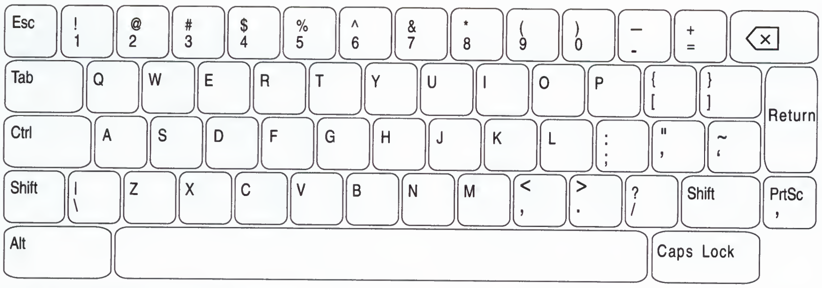
KEA Power-Station Keyboard



IBM Enhanced Keyboard

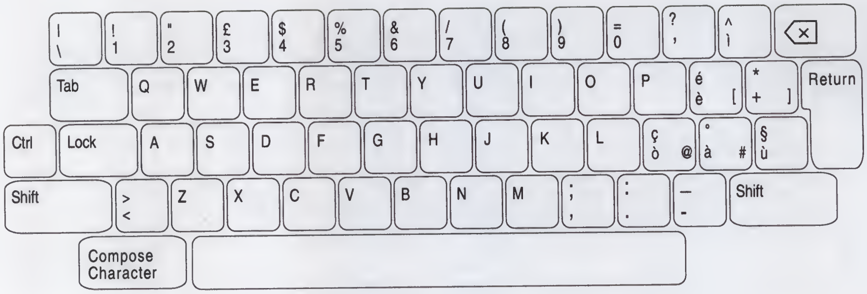


IBM AT Keyboard

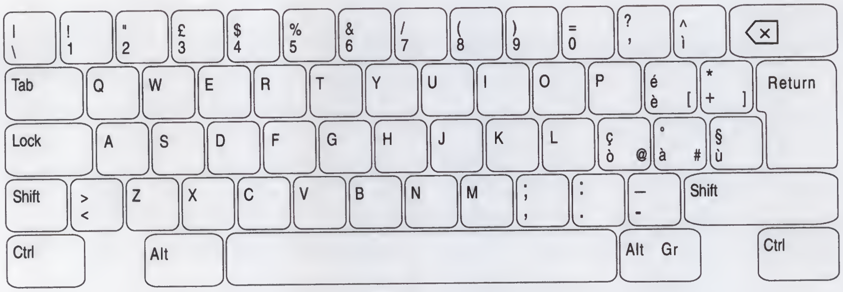


IBM XT Keyboard

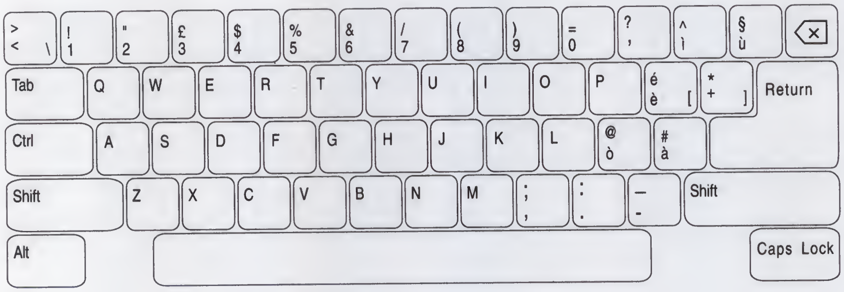
Figure 7.14. Dutch keyboard layout



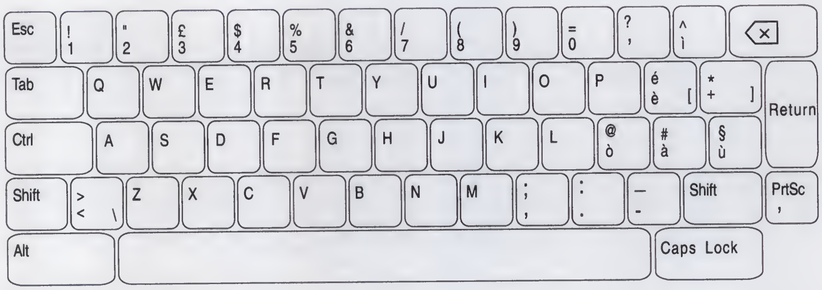
KEA Power-Station Keyboard



IBM Enhanced Keyboard

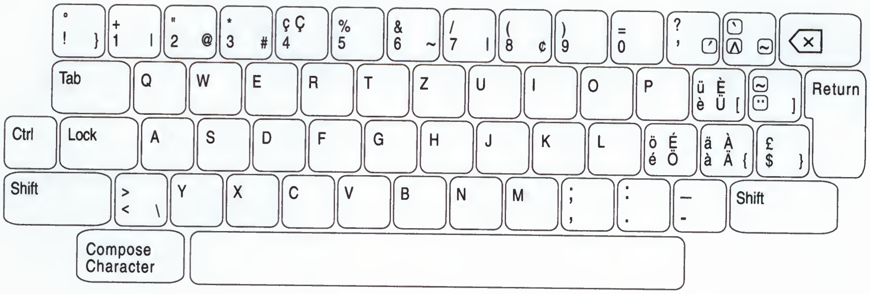


IBM AT Keyboard



IBM XT Keyboard

Figure 7.15. Italian keyboard layout



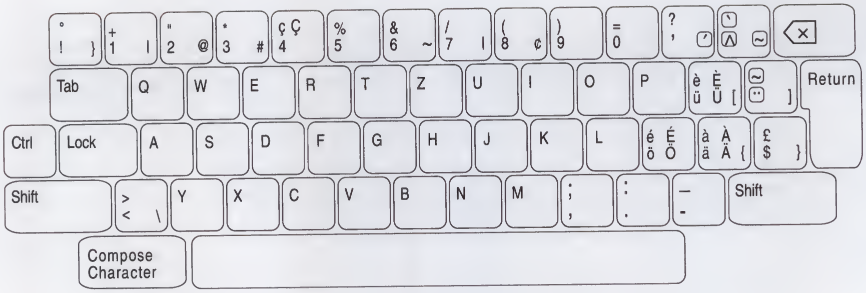
KEA Power-Station Keyboard

IBM Enhanced Keyboard

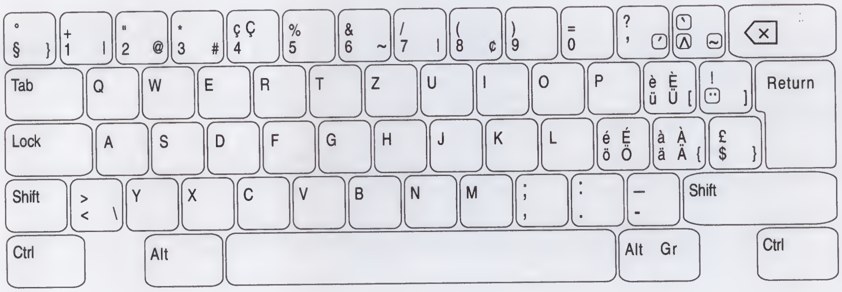
IBM AT Keyboard

IBM XT Keyboard

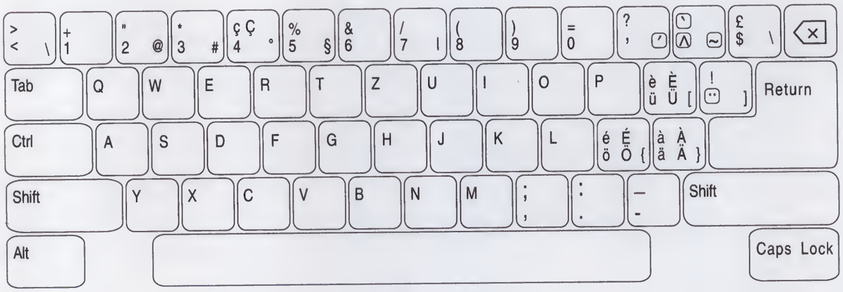
Figure 7.16. Swiss(French) keyboard layout



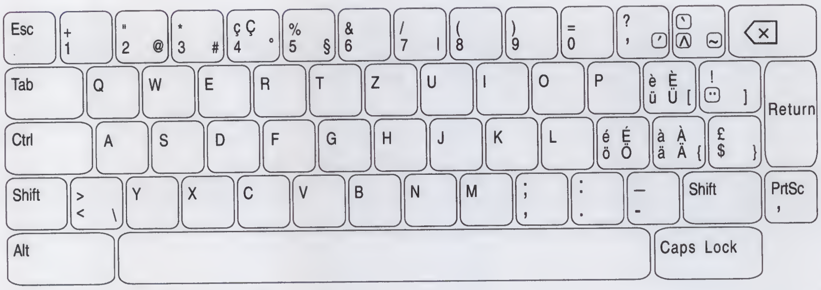
KEA Power-Station Keyboard



IBM Enhanced Keyboard



IBM AT Keyboard



IBM XT Keyboard

Figure 7.17. Swiss(German) keyboard layout

KEA Power-Station Keyboard

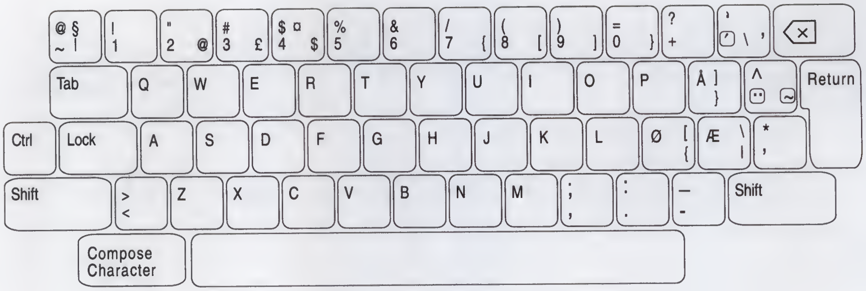
IBM Enhanced Keyboard

IBM AT Keyboard

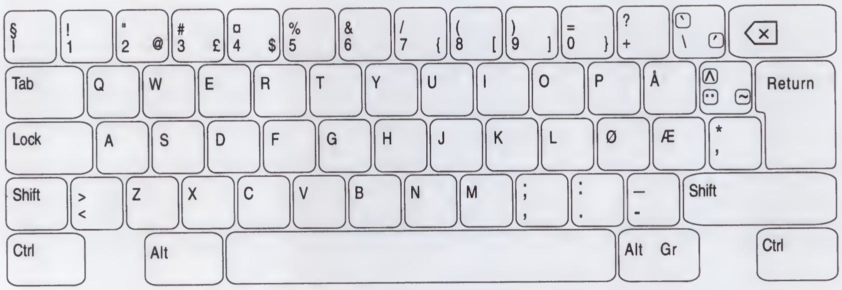
IBM XT Keyboard

Figure 7.18. Swedish keyboard layout

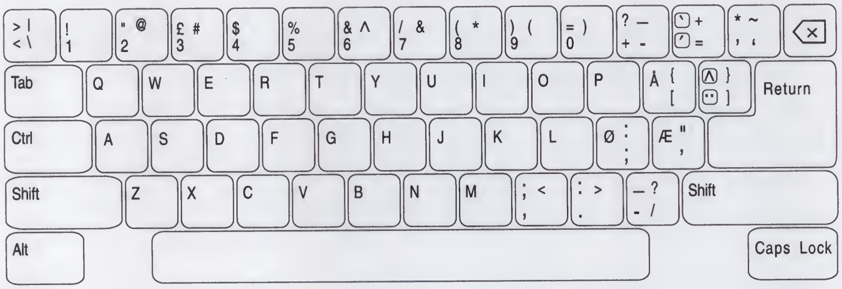
Keyboard



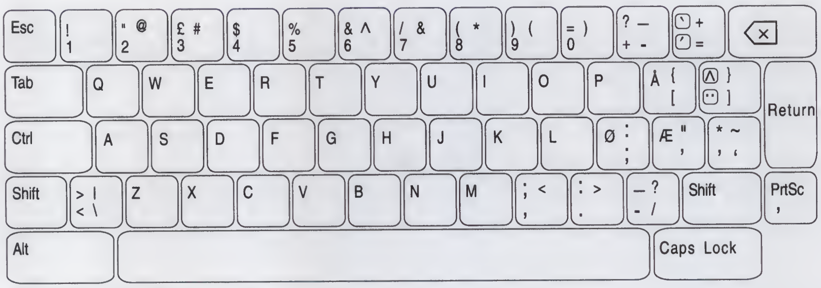
KEA Power-Station Keyboard



IBM Enhanced Keyboard

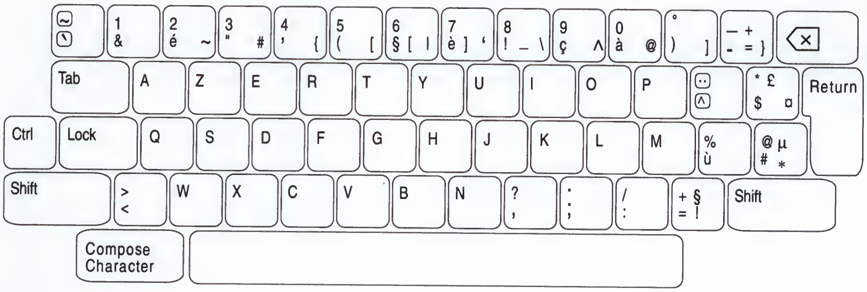


IBM AT Keyboard



IBM XT Keyboard

Figure 7.19. Norwegian keyboard layout



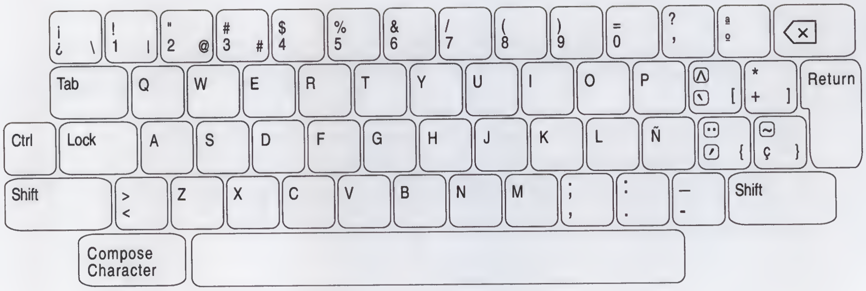
KEA Power-Station Keyboard

IBM Enhanced Keyboard

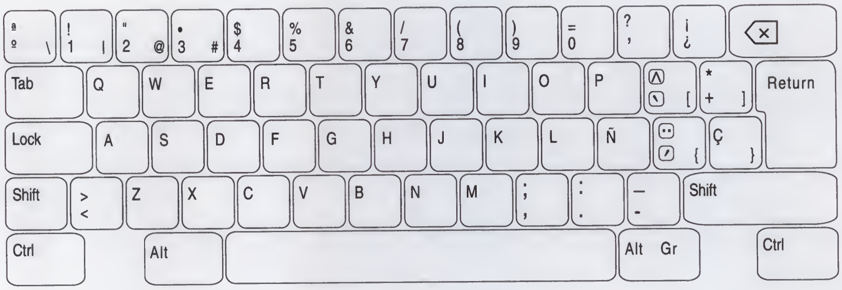
IBM AT Keyboard

IBM XT Keyboard

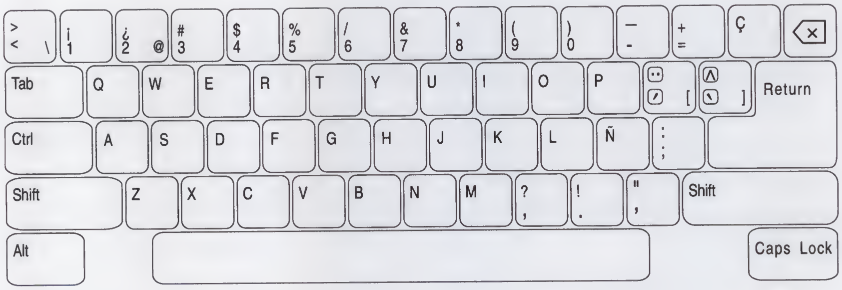
Figure 7.20. French/Belgian keyboard layout



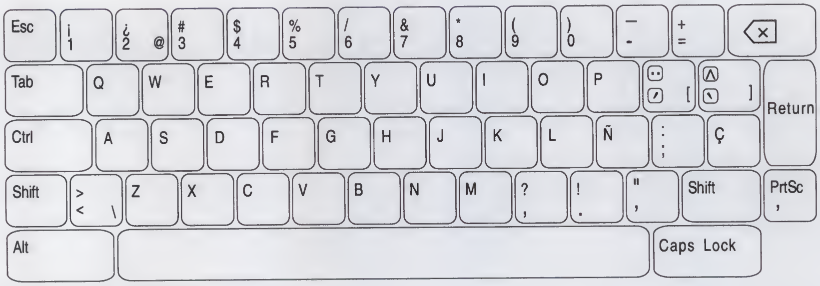
KEA Power-Station Keyboard



IBM Enhanced Keyboard

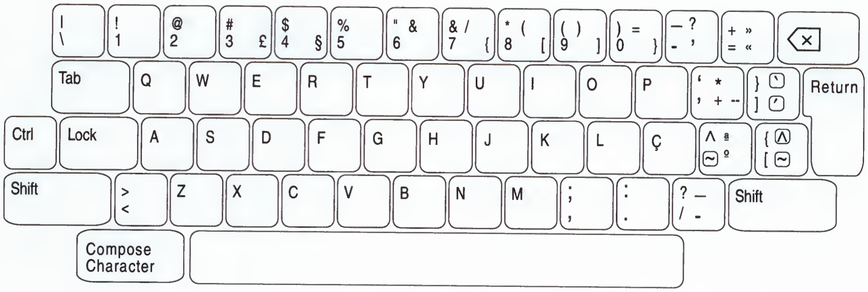


IBM AT Keyboard



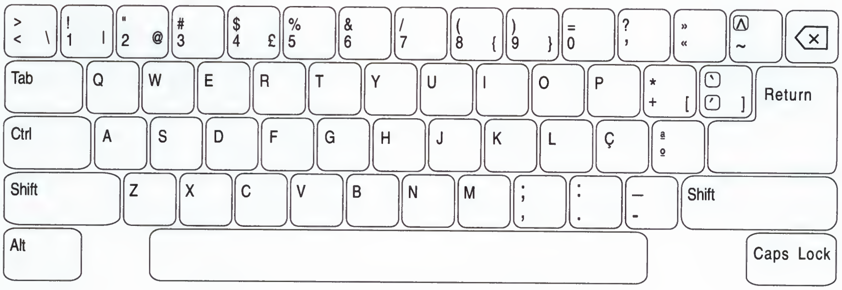
IBM XT Keyboard

Figure 7.21. Spanish keyboard layout



KEA Power-Station Keyboard

IBM Enhanced Keyboard



IBM AT Keyboard

IBM XT Keyboard

Figure 7.22. Portuguese keyboard layout

Keyboard

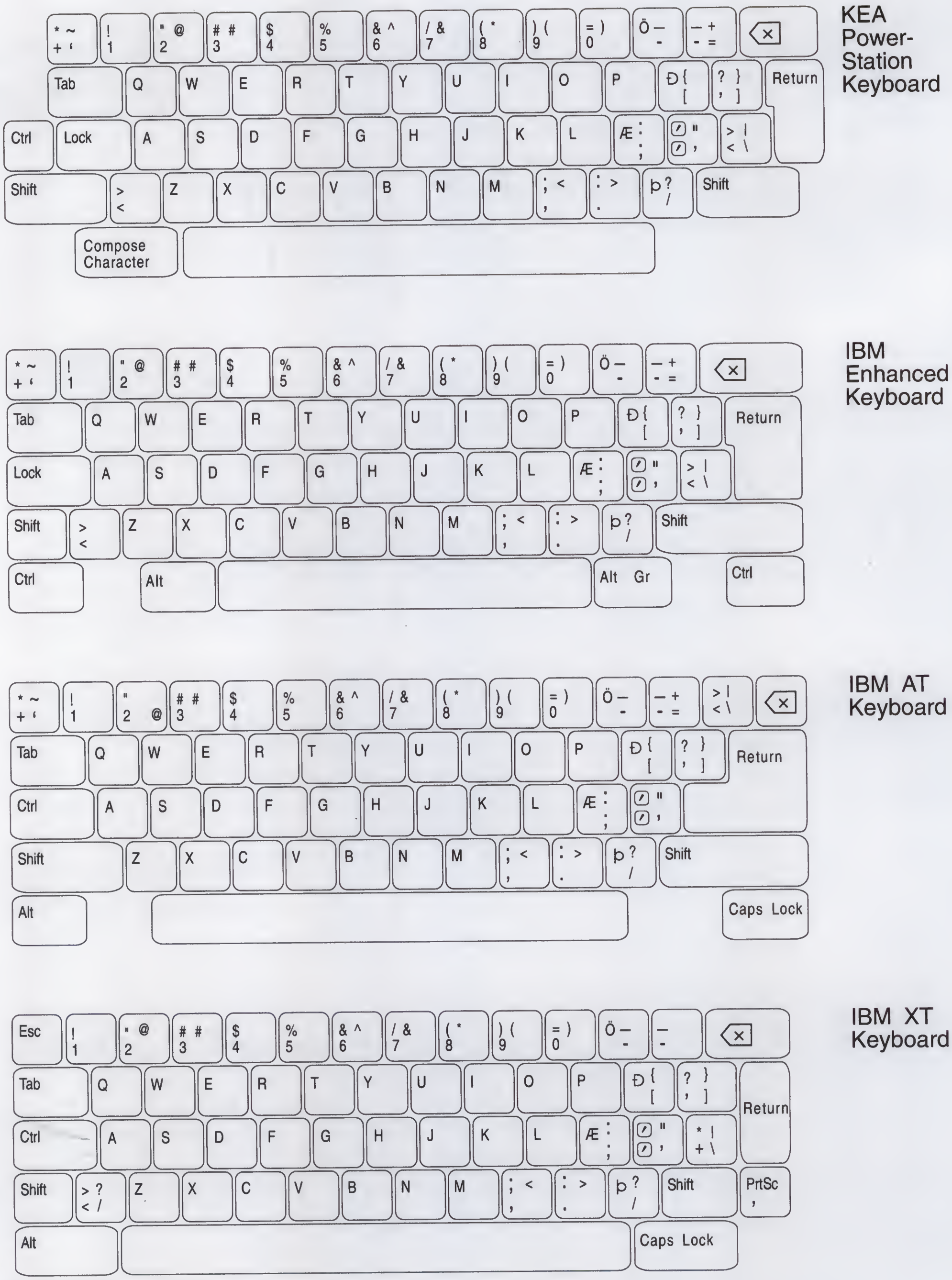


Figure 7.23. Icelandic keyboard layout

Chapter

8

Printer

Printer

Introduction to Printing Text

ZSTEM allows you both to display your VT image, and to print it on a local PC printer. ZSTEM can use most popular PC printers for printing text.

This chapter tells you how to set up your PC to print text. For text printing, most configuration items are on the Text Printer Configuration screen. To access this screen, at the "ZSTEM?" prompt, press C, SPACE, P, and RETURN.

Selecting a Printer Type for Printing Text

Before attempting to print your image, you must tell ZSTEM what type of printer you are using. ZSTEM can then properly translate image data for your printer. Most printers will emulate one of the printers that ZSTEM supports in its basic configuration. You should consult your printer manual to find out what basic "type" of printer you have. Either:

ASCII Any kind of ASCII printer, daisy wheel or dot matrix. ZSTEM will send only ASCII characters and control codes.

Epson MX Many dot matrix printers have an "Epson MX" mode.

HP DeskJet HP LaserJet HP PaintJet

IBM Graphics This is equivalent to Epson MXG (with Graftrax). Most printers have an "IBM Graphics" mode.

LN03 PLUS DEC laser printer

sixel

In the item **Type**, on the Text Printer Configuration screen, press SPACE to select the general type of printer you are using. You can select other printers if you made their drivers available during installation.

More Printer Types

ZSTEM supports other printers with special external files called ZSTEM loadable drivers. If you chose loadable drivers when you installed ZSTEM, some of the following printers may also appear among the choices for the item **Type**: **Epson LQ, Panasonic 1091, Toshiba P1351**.

Setting Up a Port for Printing Text

After you have set up your basic printer type, you must inform ZSTEM where it should send your printer data. You can send it to a ZSTEM-controlled port, a system-controlled port, a printer on a network, or a disk file. In the item **Port** on the Text Printer Configuration screen, select a printer port from one of the following sections.

ZSTEM-Controlled Port

If you let ZSTEM control the printer port, you have more flexibility than if you let the operating system control it. Also, ZSTEM will not lose characters as DOS can when it controls a port. You can choose either a parallel or a serial port.

Parallel Port

In the item **Port** on the Text Printer Configuration screen, use SPACE to select **Lpt1** or **Lpt2**. (**Lpt1** is the default value of **Port**.)

On startup, ZSTEM can send a reset command to the parallel port. If you want to ensure that the port is initialized on startup, and prior to running ZSTEM you have not set up special modes in your printer which would be undone by a reset, change the item **Reset on startup** to **Y**. The default is **N** so that ZSTEM does not send a reset.

You do not have to configure the port further; you can skip the following sections and go directly to "Printing Text."

Serial Port

In the item **Port** on the Text Printer Configuration screen, use SPACE to select **Com1** or **Com2**.

If you have an IBM PS/2 system with a multiport I/O board installed, you can select the additional value **Com3**. If you have installed additional ports on other systems, you must assign a device address and interrupt level before you can select them. Refer to "Additional Ports" in Chapter 4, "Communications."

Refer to your printer manual and ensure that the following items on the Text Printer Configuration screen match your printer settings.

Baud rate Press SPACE to select a value that matches the value used by your printer, or type one of the following values directly and press RETURN. The default value is 9600 baud.

110	150	300	600	1200	2400	3600
4800	7200	9600	19200	38400	57600	115200

Data bits This item sets the number of data bits sent in a word. The value should be **7** or **8**. This does not include stop bits or parity bits.

Stop bits Press **1** or **2** to select the number of stop bits sent with each data word. Most systems use just one stop bit. However, having two stop bits can compensate for slight differences in the baud rate between your PC and printer.

Parity Press SPACE to select outgoing parity. The values are: **None, Mark, Space, Even(No check)**, and **Odd(No check)**.

If your printer uses:

XON/XOFF software flow control

You should set the item **Protocol** to the value **Xon/Xoff**. Set the item **Ready state** to **None**. When the printer's receive buffer has reached its threshold, the printer sends an XOFF to ZSTEM.

ETX/ACK software flow control

You should set the item **Protocol** to the value **Etx/Ack**. Set the item **Ready state** to **None**. The item **Etx/Ack packet size** is the number of characters ZSTEM sends to the printer in one packet. Each packet ends with ETX. ZSTEM waits until the printer responds with ACK before it sends another packet. The packet size can be 1 to 255. Refer to your printer manual for the optimum value for your printer. The default 32 works for most printers.

RS232 signals for flow control

Set the item **Protocol** to **None**. Press SPACE to select the appropriate value in the item **Ready state**. ZSTEM can use either Data Set Ready (DSR) or Clear to Send (CTS). For each value of **Ready state** the printer is considered ready as follows:

None	- always ready
DSR1	- ready when DSR is TRUE
DSR0	- ready when DSR is FALSE
CTS1	- ready when CTS is TRUE
CTS0	- ready when CTS is FALSE

Now that you have configured the port, you can skip the following sections and go directly to "Printing Text."

System-Controlled Port

There are advantages in allowing the operating system to control the printer: you don't have to configure the physical port, and you can use the same spooler or network printing software that the system is using. However, because DOS sometimes turns off interrupts, it can cause ZSTEM to lose incoming characters. Also, most DOS implementations do not have flow control on a serial port.

If you want to let the operating system control the port, in the item **Port** on the Text Printer Configuration screen, use SPACE to select **DOS-Prn**, **DOS-Lpt1**, or **DOS-Lpt2**.

If you select a system-controlled value, you should skip the following sections and go directly to "Printing Text."

Network Printer Port

ZSTEM supports many network cards with ZSTEM loadable drivers. If you made one or more of these loadable drivers available when you installed ZSTEM, the networks suitable for printing will appear among the choices for the text printer port. They include: Bridge/3-Com, Int 14, and LAT.

In the item **Port** on the Text Printer Configuration screen, press SPACE to select the network printer port you are using. See the section "Networks" in Chapter 4 for further information.

Output to a File

You may want to capture the image on your screen and print it at a later time. For this, ZSTEM lets you specify a file for your printer "port." ZSTEM will send the data to this file as if it were the printer you configured. Then, at a later time, you can copy this file to your printer. Or you can play back a captured screen image by "sending" this file to a host. See "Sending Files" in Chapter 9. To echo the sent characters back to your screen, you may have to put your terminal in local mode.

In the item **Port** on the Text Printer Configuration screen, use SPACE to select **File**. Type a filename in the **Name** item.

Printing Text

ZSTEM will print as many character and line attributes as possible with the type of printer you have chosen. The character attributes underline and bold are always reproduced. Inverse characters appear as bold. The blinking attribute is ignored. ZSTEM's representation of the line attributes double-high and double-wide vary according to your printer. Most printers can produce double-wide characters. Most printers cannot produce double-high and merely skip an extra line.

ZSTEM also allows you to control when your text will be printed. You can print the text which is currently displayed on your screen, or print text as it is received: either line by line, or in a continuous stream. You can also send data directly to your printer, without displaying it on your screen.

Printing the Currently Displayed Text

This section describes how you can print the text currently on your screen. You must first have set up a suitable printer and port as described in the preceding sections. ZSTEM will duplicate line and character attributes as accurately as possible with the type of printer you have selected.

You can print the text while you are in command mode or normal terminal mode. Depending on the type of keyboard you have, press one of the following key combinations:

IBM XT, AT keyboard	SHIFT+PRTSC
IBM enhanced keyboard	PRINT SCREEN
KEA PowerStation keyboard	PRINT SCREEN

The host can also send print-screen commands. If you are using BIOS keyboard handling, refer to Table 13.1.

To cancel printing, press the PC Break Key CTRL+BREAK.

Continuous Printing Without Display (Printer Controller)

In Printer controller mode, received characters are sent to the printer and are not displayed. Printer controller mode is usually turned on by a control sequence from the host. You can turn on this mode too, by setting item **Mode** on the Text Printer Configuration screen to **Controller**.

If the item **Strip escape sequences** on the Text Printer Configuration screen is set to **Y**, escape sequences and most control codes (except FF, CR, LF, TAB, and VT) are stripped before being sent to the printer. In addition, if the item **Type** on the Text Printer Configuration screen is **Ascii**, 8 bit data will be stripped to 7 bit data before being sent to the printer. If **Type** is not **Ascii**, 8 bit DEC Multinational characters will be translated to IBM Graphics characters before being sent to the printer.

If the item **Strip escape sequences** on the Text Printer Configuration screen is set to **N**, no translation will take place. Some VAX applications format data specifically for PC printers; translation is not needed.

In printer controller mode, special attributes such as 132 column mode, double-high/double-wide and all character attributes will be ignored.

Printing Line by Line (Autoprint)

In autoprint mode, ZSTEM sends each line of text to the printer as the line is completed on the screen. To toggle autoprint mode, press one of the following key combinations:

IBM XT, AT keyboard	CTRL+PRTSC
IBM enhanced keyboard	CTRL+PRINT SCREEN
KEA PowerStation keyboard	CTRL+PRINT SCREEN

There is an equivalent way to turn on autoprint mode: change the item **Mode** on the Text Printer Configuration screen from the default **Normal** to **Auto**.

ZSTEM will duplicate line and character attributes as accurately as possible with the type of printer you have selected.

Continuous Printing With Display

If you want, ZSTEM can send characters to the printer at the same time as they are displayed; they are not delayed (as in autoprint mode) until the line is completed. In

this continuous mode of printing, some formatting is lost; you may prefer to use autoprint mode as described in the preceding section "Printing Line by Line." To enable this mode of printing text, set item **Printer status** on the Text Printer Configuration screen to **On**.

There is another, equivalent way you can show and set the printer status. Because this method does not use the configuration screens, you may find it more convenient for quick on-line changes. To change the printer status,

- At the "ZSTEM?" prompt, type **PRINTER** and press RETURN. You can shorten this to **PR**.
- The following is displayed:

  `Enable printer (state)?`

  where state tells if the printer is currently enabled (Y) or not (N).
- To retain the current state, press RETURN.

  or

  To enable direct output to the printer, press Y, RETURN.

  or

  To disable the printer, press N, RETURN.

You will probably want to set the item **Strip escape sequences** to **Y** to translate the character stream for your particular printer. See the following section "Interpreting Incoming Data for the Printer."

Text Options

The following text printing options affect the way ZSTEM prints characters already on the screen, and the way ZSTEM prints characters as they arrive.

These items are on the Text Printer Configuration screen.

Formatting Images Already on the Screen

The following options affect how characters already on the screen are interpreted when printed by a print-screen command, or printed in Autoprint mode (**Mode** is set to **Auto**). In the item **Data type** on the Text Printer Configuration screen, press SPACE to select one of:

DEC Multinational
: ZSTEM maps characters to suit the printer type you have selected in the **Type** item.

IBM Graphics
: No mapping is attempted. All of the possible printer types in the **Type** item, except **ASCII**, can print the IBM Graphics character set to some degree.

You can control the extent of a screen print. That is, whether the entire page or only the current scrolling region is printed. In the item **Print amount** select **Page** or **Region**.

To control whether ZSTEM sends a Form Feed to the printer after printing the screen image, select **Y** or **N** in the item **FF at print page end**.

Interpreting Incoming Data for the Printer

The following option affects the translation of characters being printed as they are received, either because **Mode** is set to **Controller**, or **Printer status** is set to **On**, or you gave the ZSTEM command PRINTER.

Unless the host has inserted escape sequences for your particular printer type, the item **Strip escape sequences** on the Text Printer Configuration screen should be set to **Y**. All 7-bit and 8-bit escape sequences are removed. Most single-character 7-bit and 8-bit control codes are removed; the codes NUL, BEL, BS, HT, LF, VT, FF, CR are not removed. If the item **Type** is set to **ASCII**, non-ASCII characters are not printed. If the item **Type** is set to other than **ASCII**, ZSTEM will translate as many Multinational, DEC Special and foreign characters as it can to the corresponding IBM Graphics characters.

If the host has formatted the data for your particular printer, set **Strip escape sequences** to **N**. ZSTEM does nothing to the incoming data before sending it to your printer. Some VAX applications format data specifically for PC printers; translation is not needed.

Miscellaneous printer options

If you want to print 132-column text on a narrow-carriage printer, you should set your printer to compressed mode. Refer to your printer's operating instructions.

Local Mode, described in Chapter 4 "Communications," is useful in setting special printer characteristics. To send control sequences to your printer, first enable output to your printer. (You could do this by setting the item **Mode** to **Controller**.) Then, in Local Mode, type the desired printer control sequence. Or you could do the whole operation in a softkey program. Refer to Chapter 11, "Using Softkeys."

You can use your PC running ZSTEM as a data line monitor. Refer to Chapter 14, "Programmer Reference." If you are not using this feature, leave the item **Printer to host** set to **N**.

Chapter

9

Simple File Transfer

Introduction

ZSTEM allows you to easily transfer ASCII files between your PC and another computer with the DISK command.

You can use the DISK READ command to "upload" files to another computer just as if you were typing the data on your keyboard. This is also a handy way of "playing back" files that you have previously captured. You can use the DISK WRITE command to "download" or "capture" for future use information that your host is sending to your terminal.

Simple file transfer does not use any special file transfer protocol. It also has the advantage of not requiring any host software support. This method, however, does not perform any error correction. If you want to use noisy communications lines, you should use the error-correcting file transfer mechanisms described in Chapter 10.

The DISK command was designed to send and receive files that would normally be displayed on your screen. If you transfer non-displayable files, or files with binary data, they will appear as "garbage" on your screen. In addition, you must ensure that ZSTEM does not mistakenly translate any binary characters. See the sections "Xon/Xoff Protocol", "Sending Line Terminators" and "End of File Character" for details on how to turn off translation of those characters.

The following section, "Sending Files", describes how you can use the DISK READ command to upload files to another computer. It also describes the different parameters that affect how your file is transferred.

The section "Capturing Data", describes how you can use the DISK WRITE command to capture onto disk data being sent to your display. The different parameters controlling data capture are also described.

Sending Files

The DISK READ command allows you to send data to another computer just as if you were typing that data on your keyboard. Information on the general use of ZSTEM commands is contained in Chapter 3.

If you want the information that you are "typing at your keyboard" to be recorded in a file on your host, you will probably want to run a program at the host end to capture this data. For example, you could use an editor in insert mode.

Most of the items related to sending files are on the ASCII File Transfer Configuration screen. If the default values are suitable for your environment, you can leave the values as they are, and immediately send your file. See the section "Sending Options" for more information.

To Send a File

The following instructions assume that ZSTEM is running in its normal emulator mode, and that you have logged on to your host.

- Prepare your host to receive an ASCII file. You could either run an editor program, or some other utility or operating system function that stores "keyboard" data in a file. For example, if you are connected to a VAX system running VMS, you could type at the VMS "$" prompt: **CREATE MYFILE.SAV**
- Press ALT+Z to access ZSTEM command mode.
- At the "ZSTEM?" prompt, type **DISK** and press RETURN. You can shorten this to **DI**.
- At the prompt:

```
Select Read, Write, Close, Hold, or Abort:
```

press R, RETURN.

- At the prompt:

  ```
  Read file name?
  ```

  type the path name of the file you want to send to the host and press RETURN. If you are sending a file in the default directory on the default drive, the path name will simply be a filename. ZSTEM then begins reading the file and sending it to the host.

- While the file is being sent, only the following commands are available. You can stop sending the file by pressing CTRL+S and resume it by pressing CTRL+Q. Or you can use HOLD SCREEN (usually mapped to F1 or SHIFT+F1 on the PC keyboard) which sends alternately CTRL-S and CTRL-Q. You can abort sending by pressing CTRL+BREAK. If you type anything else, ZSTEM will ignore it and respond with a beep.

- ZSTEM completes sending when it reaches the physical end of file. (If your PC file uses a CTRL-Z to signal end-of-file, see the following section "End-of-File Character"). ZSTEM remains in emulator mode. The utility program or command which your host is executing may now be waiting for you to type something to end its reception. For example, if you gave a CREATE command to VMS, you would now press CTRL+Z to close the created file.

You can shorten the above steps to: **DI R** *filename*.

Sending Options

You may be able to successfully transfer files using ZSTEM's default options. You may, however, need to adjust the flow control to conform to your host or change another of the options.

Most of the following options are found on the ASCII File Transfer Configuration screen. To access this screen, at the "ZSTEM?" prompt, press C, SPACE, A, and RETURN.

ZSTEM uses a flow control protocol when it sends an ASCII file. This protocol can be either Xon/Xoff, or Eob/Ack. The protocol you choose must conform to the protocol used by your host. Xon/Xoff is ZSTEM's default protocol.

Xon/Xoff Protocol

When your PC sends a file using the Xon/Xoff protocol, it will temporarily stop sending data if it receives an Xoff character (also called DC3) from the host, and will resume sending when it receives an Xon character (also called DC1) from the host. To choose the Xon/Xoff protocol, set **Protocol** on the ASCII File Transfer Configuration screen to **Xon/Xoff**.

Eob/Ack Protocol

When your PC sends a file using the Eob/Ack protocol, it will continue sending until it finds the Eob (end-of-block) character in the data it is sending. It will then wait until the host sends the Ack (acknowledge) character. To choose Eob/Ack protocol, set **Protocol** on the ASCII File Transfer Configuration screen to **Eob/Ack**. NOTE: If you have not changed the default values for the Eob/Ack characters, you must set the item **Disable Xon/Xoff in Eob/Ack** mode to **Y**. Otherwise ZSTEM will confuse the Eob/Ack characters with Xon/Xoff.

The number of blocks of data that ZSTEM will send before it waits for an Ack is the value of **Eob/Ack read window**. The default is **1**. Setting it to a greater value (up to 16) can sometimes increase the speed of file transfer and still maintain flow control. The best setting depends on your network and host buffering capability.

The characters which ZSTEM uses for Eob and Ack are normally CR and Xon (also called DC1). If your host uses different characters, you can change the characters ZSTEM uses by specifying different characters in the items **ASCII Eob character** and **ASCII Ack character**. You can enter the character itself, or its hexadecimal equivalent, or its usual ASCII name enclosed in <>. If you need ZSTEM to also obey received Xon/Xoff requests, you must change the Ack character to other than Xon, and you must set the item **Disable Xon/Xoff in Eob/Ack mode** to **N**.

Slowing Down the Transfer

Your host may be unable to accept input from your PC (which appears to be coming from your "keyboard") as fast as ZSTEM can send it. If you have this problem, you can instruct ZSTEM to delay a few milliseconds between each character it sends, rather than sending the characters as fast as it can. The item which controls this is **Intercharacter delay** on the Session Configuration screen (not the ASCII File Transfer Configuration screen). You can set the delay in milliseconds to any value in the range 0 to 255. This item also affects the sending rate of Softkey characters and Kermit and Xmodem file transfers.

Your host may be able to process characters as quickly as it receives them, but needs a delay time after each line. If you set a value between 0 and 255 in the item **Interline delay** on the ASCII File Transfer Configuration screen, ZSTEM will delay the specified number of milliseconds after sending a CR. This item only affects the sending of files with the DISK READ command.

Pause During the Transfer

There is a ZSTEM private escape sequence which puts your display into Hold Screen mode. The sequence **CSI 2.z** has this effect only when ZSTEM reads it during a DISK READ (not at the end of the file). You can release the hold by pressing HOLD SCREEN or CTRL+Q. On a PowerStation keyboard, press HOLD SCREEN twice.

Echo

A host normally echoes, or sends, each character it receives back to the terminal. During a file send, characters are sent out the communications port just as if they were typed at your keyboard. The host therefore echoes each character back to your "terminal". To save time, you might want to instruct your host not to echo received characters when you are performing a DISK READ. ZSTEM will then not have to spend time extracting flow control characters and displaying the echoed data. The command to turn off "keyboard echo" varies from host to host. For example, on a VAX running VMS you would issue the command SET TERMINAL/NOECHO.

If you have turned off host keyboard echo, but still want to see the text that you are transmitting, you can set the ASCII File Transfer Configuration screen item **Local echo on read** to **Y**. ZSTEM will then send all characters to the screen as well as out the communications port.

Sending Line Terminators

A PC typically uses the CR-LF pair as a line terminator. Most hosts, however, only need to receive a CR. ZSTEM gives you the option of sending a CR, a CR-LF, or a LF when it encounters the CR-LF pair during a DISK READ. You can control the value that ZSTEM sends with the item **Send new line as** on the ASCII File Transfer Configuration screen.

Padding a Null Line

Some IBM hosts with ANSI protocol converters will not accept the sequence CR LF CR LF. You can instruct ZSTEM to pad any such sequences that it finds, by inserting a character after the first LF. The default pad character is a space.

To turn on null line padding, set the item **Null line pad character** to the value **on**. ZSTEM uses the default pad character. You could use another pad character, such as DEL or NUL, by entering the character (or its hexadecimal equivalent, or its usual ASCII name enclosed in <>) in the item **Null line pad character**. To turn off padding, enter the value **off**.

Signal on Completion

Normally, when the file send is complete, the bell will sound. If you set the item **Bell on read end** to **N**, the bell will not sound.

End-of-File Character

The item **Ctrl/Z is EOF on read** on the ASCII File Transfer Configuration screen determines whether or not a DISK READ will terminate when a CTRL-Z character is encountered. If set to **Y**, ZSTEM will assume it has reached end-of-file when it sees a

CTRL-Z. If set to **N**, ZSTEM will continue sending until it reaches the physical end-of-file.

Capturing Data

The DISK WRITE command captures any data that would normally be displayed on your screen. It is an easy way to transfer simple files to your PC. Because everything you type is normally sent to your screen, you could also use this command to record an entire exchange. Information on the general use of ZSTEM commands is contained in Chapter 3.

To Capture Data

The following instructions assume that ZSTEM is running in its normal emulator mode, and that you have logged on to your host.

- Press ALT+Z to access ZSTEM command mode.
- At the "ZSTEM?" prompt, type **DISK** and press RETURN. You can shorten this to **DI**.
- ZSTEM responds with:

  ```
  Select Read, Write, Close, Hold, or Abort:
  ```

  Press W, RETURN.
- At the prompt:

  ```
  Write file name?
  ```

  type the path name of the file you want to create and press RETURN. You can shorten the above steps to: **di w** *filename*. If you are creating the file in the default directory on the default drive, the path name will simply be a filename. There is no default filename. If you enter the name of a file which already exists, its contents will be overwritten. ZSTEM gives no warning! If you are unsure of a suitable filename, you could just press RETURN, taking you back to the ZSTEM prompt. You can then use ZSTEM's RUN command to call the DOS DIRECTORY function to help you decide on a filename.

- At the "ZSTEM?" prompt, press RETURN and ZSTEM will go back to emulation mode. Anything that is displayed on your screen will now be recorded, including characters you enter from your keyboard. The item **Current write file** indicates the opened file.
- You can temporarily suspend writing data by returning to the "ZSTEM?" prompt and typing **DI H**. The DISK HOLD command lets you continue in emulation mode, without capturing incoming data. When you give another DISK WRITE command, ZSTEM will resume the capture to the same file. To quit the capture and discard it, give the DISK ABORT command.
- When you have captured all the data you require, close the file by returning to the "ZSTEM?" prompt and typing **DI C**. (ZSTEM will automatically close any files opened with a DISK WRITE when ZSTEM exits.)

Capture Options

You may be able to successfully transfer files using ZSTEM's default options. You may, however, need to adjust the flow control to conform to your host or change another of the options.

Most of the following options are found on the ASCII File Transfer Configuration screen. To access this screen, at the "ZSTEM?" prompt, press C, SPACE, A, and RETURN.

ZSTEM uses a flow control protocol when it receives an ASCII file. This protocol can be either Xon/Xoff, or Eob/Ack. The protocol you choose must conform to the protocol used by your host. Xon/Xoff is ZSTEM's default protocol.

Xon/Xoff Protocol

When your PC captures data using the Xon/Xoff protocol, the host will temporarily stop sending when it receives an Xoff character (also called DC3) from your PC and will resume sending when it receives an Xon character (also called DC1) from your PC. To choose Xon/Xoff protocol, set **Protocol** on the ASCII File Transfer Configuration screen to **Xon/Xoff**.

Eob/Ack Protocol

When your PC captures a file using the Eob/Ack protocol, the host will continue sending until it encounters the Eob (end-of-block) character. It will then wait until the PC sends the Ack (acknowledge) character. To choose Eob/Ack protocol, set **Protocol** on the ASCII File Transfer Configuration screen to **Eob/Ack**. NOTE: If you have not changed the default values for the Eob/Ack characters, you must set the item **Disable Xon/Xoff in Eob/Ack mode** to **Y**. Otherwise ZSTEM will confuse the Eob/Ack characters with Xon/Xoff.

The characters which ZSTEM uses for Eob and Ack are normally CR and Xon (also called DC1). If your host uses different characters, you can change the ZSTEM characters by setting the new characters in the items **ASCII Eob character** and **ASCII Ack character**. Enter the character itself, or its hexadecimal equivalent, or its usual ASCII name enclosed in <>.

If you do not want to save the Eob characters with the rest of the captured data, set the item **Strip Eob on write** to **Y**.

Writing Line Terminators

A PC typically uses the CR-LF pair as a line terminator. ZSTEM, however, gives you the option of writing a CR-LF, or just a LF, when it encounters the CR-LF pair during a DISK WRITE. You can control the value that ZSTEM writes with the item **Write received CR-LF as**.

Escape Codes

If you do not want incoming escape sequences written to your file, set the item **Strip escape codes** to **Y**.

Translating Characters

If necessary, ZSTEM will translate between host character sets and your local PC character set. Translation can be performed during all text file transfers: ASCII, KERMIT and X/YMODEM. The translation operates the same with all file transfer methods. All you need to do is identify the local and host character sets. (Often this is already done for you.)

In the particular case of Capturing Data, as described in this chapter (DISK WRITE command), the item **Strip escape codes** must be set to **Y** for translation to occur.

You can also use the ZSTEM command TRANSLATE to translate a file without having to transfer it. You might use this command if you previously moved a file to your PC, but forgot to translate it at that time. At the "ZSTEM?" prompt, type **TRA** *inputfile outputfile*. ZSTEM asks:

```
Is input in Local or Host alphabet (L)?
```

Reply with **L** or **H** to indicate the translation direction.

Identifying Your Character Sets

Local character set

The Local character set is specified on the Display Configuration screen, item **Text code page**. This item can have value **Country**, which uses the code page that is current in the PC. Or you can set this item to one of the code page values **437**, **850**, **860**, **863**, **865** which override the current code page. If your DOS version is prior to 3.3, you must specify a particular code page number.

Host character set

The configuration item **Translation** controls whether or not translation is performed. If translation is performed, this item specifies the host character set. Although this item appears on all three file transfer configuration screens, it is only one item. Changing it on one screen changes it on all screens. The values for this item are as follows:

None
No translation

ISO Latin 1
the host data is in the 8 bit ISO Latin 1 character set.

DEC-MCS
the host data is in the 8 bit DEC Multinational character set.

ASCII
the host data is only ASCII. On transmitting, the 8 bit accented characters will be translated to standard ASCII characters.

National
The 7 bit National character set for the county specified in **Keyboard language** is assumed.

Automatic
The host character set is determined by three fields on the General Configuration screen.
If **Character set mode** is **Multinational**, the character set is according to the value of **User Preferred Supplemental (DEC-MCS, ISO Latin 1, IBM Graphics)**
If **Character set mode** is **National**, the character set is according to the **Keyboard language** (17 selections)

Custom
This value allows you to use your own customized translation table for both incoming and outgoing translation. See the following section.

Custom Translation Table

You can use your own customized translation table for both incoming and outgoing translation. Such a table exists as a simple text file, which specifies a translated value for every incoming and outgoing character.

Making a custom table is easy if you start with one of the standard translation tables. Put something other than **None** or **Custom** in the item **Translation**. Then give the ZSTEM command TABLE DUMP and supply a filename to be created. Examine the translation table produced; it is a printable ASCII file. You can edit the file with any text editor.

The format follows the specification defined by the Kermit protocol. ZSTEM uses a subset of this specification. For complete details regarding the Kermit Protocol definition for translation, contact Columbia University.

The file contains two sections: one for translating host to local data, called the COMMON section, and one for translating local to host data, called the LOCAL section.

Each section consists of a header and a translation table. The header is defined in table 9.1. In the translation table, each line contains a pair of characters or strings in ASCII decimal representation. The members of the pair are separated by a comma. An optional comment is separated by a semicolon.

```
<char from host set>,  <char from local set> ; <comment>
```

To use this file as a custom translation table, give the ZSTEM command TABLE LOAD. It prompts for a filename, and tests the syntax of your edited translation table. If it passes, ZSTEM sets the item **Custom mapping file** to the name of your translation table, and sets **Translation** to the value **Custom**. (Although **Custom mapping file** appears on all three file transfer configuration screens, there is only one item.)

TABLE 9.1
Translation Table Header

line	description
1	Not used.
2	The word COMMON or LOCAL. This defines the SOURCE character set.
3	Not used.
4	Number of bytes per character in the source character set (1).
5	Not used.
6	Not used.
7	Number of bytes per character of target set (1).
8	Not used.
9	Not used.
10	Not used.
11	For Kermit only, this is the Registration number of COMMON character set. It can be blank or contain the string "I6/100". Not used for other file transfer methods.
12	Not used.
13	Number of entries in the translation table.
14	Count of lines n between this line and beginning of translation table (usually 0).
15-14+n	Reserved for future use.
15+n	Beginning of translation table.

Examples

Sending an ASCII File to a VAX Host

The DISK READ command is a convenient way of sending text files from your PC to a VAX host. To the VAX host, it will appear that the text is simply being generated from the terminal keyboard. Because ZSTEM sends the file at a much faster rate than an actual keyboard could, the VAX host will find it necessary to issue flow control commands during the transfer, to avoid overflowing its type-ahead buffer. However, on most VMS systems, host flow control is disabled by default. So before you can reliably transfer a file to the VAX host, you must enable host flow control with the VMS command:

```
$ SET TERMINAL/HOSTSYNC
```

If you are transferring 8-bit data, ensure that both ZSTEM and the VAX can handle 8-bit data. For ZSTEM **Terminal mode** on the General Configuration screen must be set to **VT300/7-bit** or **VT300/8-bit**. On the Session Configuration screen, **Data bits** must be set to **8**. On the VAX, you can use the VMS command:

```
$ SET TERMINAL/EIGHT_BIT
```

To transfer a file, use the VMS command CREATE. The CREATE command is more reliable than EDT for this purpose.

```
$ CREATE TEXT_FROM_PC.DAT
```

Then press ALT+Z to go into ZSTEM command mode. Invoke the DISK command, its READ subcommand, and specify the file(s) you wish to send to the VAX.

```
ZSTEM? di r text2vax.dat
```

When all the text has been sent, press CTRL+Z to signal the end of the CREATE input.

Capturing and Replaying a Terminal Session

The DISK WRITE command is also a convenient way of recording or capturing your terminal session for later replay. Before starting your capture, make sure you have entered all of the commands you do not want written to disk. You must then press ALT+Z to access ZSTEM command mode and initiate the disk write. At the "ZSTEM?" prompt, type **DISK** and press RETURN and answer the prompts as follows.

```
Select Read, Write, Close, Hold, or Abort: W
Write file name? session.dat
ZSTEM?
```

(You can shorten this exchange to **DI W SESSION.DAT**.)

You will now be in emulation mode. Any data that is now displayed on your screen will also be written to your PC disk.

When you no longer wish to record your session, you must give the DISK CLOSE command to terminate the disk write and close your file. At the "ZSTEM?" prompt, type **DI C**.

Your session will then be recorded on your PC in the file SESSION.DAT. You could replay this session, using the DISK READ command. Before giving the DISK READ command, you must put your PC into local mode. This will prevent the data you display from being sent to your host. Press ALT+Z to access ZSTEM command mode, and at the "ZSTEM?" prompt, type **LO Y**.

You can then replay your file by typing at the "ZSTEM?" prompt:
DI R SESSION.DAT.

Your session will now be redisplayed on your screen, just as it appeared when you captured it. If you want to temporarily stop the replay, press HOLD SCREEN. If you want to abort the replay, press CTRL+BREAK.

Transfer 2

Chapter

10

Error-Corrected File Transfer

Transfer 2

Transfer 2

Introduction to Kermit

ZSTEM supports three methods of file transfer. "Simple File Transfer", described in Chapter 9, is a way of transferring files without error-correction. Kermit, Xmodem and Ymodem, three error-correcting methods of transferring files are described in this chapter. The first half of this chapter is dedicated to the Kermit file transfer protocol. If you are interested in transferring files with the Xmodem or Ymodem protocol, skip immediately to the section "Introduction to Xmodem and Ymodem".

Developed at Columbia University, Kermit allows you to transfer binary and text data between various types of computers. To transfer files using this protocol, both your PC and the host, or remote computer must be running compatible versions of Kermit.

ZSTEM implements the standard Kermit protocol, including the large packet and sliding windows options. These options are negotiated between ZSTEM and the remote Kermit and both must agree on this method before it will be used. Sliding windows Kermit will perform significantly better than standard Kermit.

In the manual, references to the Kermit protocol have only the 'K' in upper case. References to ZSTEM's KERMIT command have the whole word in upper case.

Most of the Kermit configuration items referred to in this chapter are found on the Kermit Configuration screen. To access this screen, at the "ZSTEM?" prompt, press C, SPACE, K, and RETURN.

For further information on the Kermit protocol refer to the "Kermit User's Guide" and the "Kermit Protocol Manual" available from The Columbia University Center for Computing Activities, New York, NY 10027. Or refer to the book "KERMIT - A File Transfer Protocol," by Frank da Cruz, Digital Press, Massachusetts, 1987.

Using ZSTEM's KERMIT Command

Before Using the KERMIT Command

Before using ZSTEM's KERMIT command you should do the following:

- Determine whether or not you will be running either of the Kermit ends in server mode. See the section "About Server and Non-server Kermits" for more details.
- Ensure you have properly configured ZSTEM to run Kermit. See the section "Kermit Configuration" for more details.
- Set up your host or remote end so that it is running in the appropriate Kermit mode. You may have to give a Kermit command on the remote end before giving the complementary command on your local Kermit.

The KERMIT Command

You are now ready to give the KERMIT command to ZSTEM.

```
ZSTEM? k
```

ZSTEM will then offer you the following choice of Kermit commands:

```
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd:
```

Although the User Manual uses this long form of KERMIT command entry, you can always type the command on one line, avoiding the intermediate prompts. For example, at the "ZSTEM?" prompt, you can type **K S** *filename* and press RETURN.

The section "When Both Ends Are Non-server Kermits" describes the use of the Send and Recv commands when you are transferring files between two computers running non-server Kermit.

The section "When the Host Is a Server Kermit" describes the Kermit Send, Get and Fin commands when you are transferring files between your PC and a host or remote computer running server Kermit.

The section "When ZSTEM Is a Server Kermit" describes the use of the SERv command.

The Cmd command is used to issue local DOS commands as described in the section "DOS Commands" and to issue commands to the server Kermit as described in the section "Generic Server Commands".

The remaining commands are detailed in "Other Kermit Commands".

Kermit Status Line

During KERMIT sends and most receives, a status line normally appears on your screen.

```
t min left [■■■■■    ]  n retries  n errors  n timeouts
```

The **min left** value and the progress indicator tell you how the transfer is proceeding. Each counter value n is reset to zero at the start of each file transfer. These counters have the following meanings:

retries — This is the number of errors that have occurred while transferring the current data block. If it reaches the value of item **Error retry limit**, the transfer will abort. It is cleared to zero whenever a block is successfully transferred.

errors — This is the total number of errors; it is not reset during the transfer.

timeouts — This is the total number of timeout conditions that have occurred during the file transfer. It is not reset during the transfer. If timeouts occur repeatedly, the remote system may not be using Kermit protocol.

During Kermit receives in which the file size is unknown (the remote end sent no file size attribute) a different status line appears on your screen. The mins value tells you the elapsed time since the transfer started.

```
t mins  n KBytes  n packets transferred  n retries  n errors  n timeouts
```

Kermit Log

Before transferring each file, ZSTEM will display a pair of messages with contents as follows:

hh:mm:ss Sending *localfile* as *remotefile* (*type*)

Packet-size window-size check file-size time-est

where *Localfile* and *remotefile* are the actual filenames and *type* can be either "binary" or "text".

As ZSTEM finishes transferring each file, it displays a message similar to the following:

hh:mm:ss File send done: ch/sec file-size errors time-elapsed

For a file being received, the word receive is substituted for send.

If you are transferring a large number of files, or running your file transfer unattended, you may want to send or "log" this information to a file for later review. You can do this by specifying a filename in **Log file** on the Kermit Configuration screen.

Quiet Mode

If you are using a multitasking program such as DESQview or MultiLink, you might want to run file transfer in the background. For this, you should suppress Kermit output to the screen. You can do this by specifying the quiet mode option when you run Kermit commands. A long bell notifies you when the quiet mode transfer is complete. ZSTEM will remain in quiet mode until you select its task and press any key.

To transfer files in quiet mode, include "Q" in the ZSTEM KERMIT command line.

For example, the following line puts ZSTEM in quiet mode for the subsequent file send:

```
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: q s
```

Aborting Kermit

ZSTEM allows you to abort the file transfer in progress. It can abort in the three following ways:

- To abort only the current file, press CTRL+X. If ZSTEM is receiving and the remote Kermit does not accept the abort, the remote Kermit may continue to send the file, but ZSTEM will delete it.
- To abort the current group of files, press CTRL+Z. If ZSTEM is receiving and the remote Kermit does not accept the abort, it may continue to send the remaining files in the group. In this case ZSTEM will delete the current file but will receive and keep the remaining files.
- As a last resort, to abort the transfer without notifying the remote Kermit, press CTRL+BREAK. ZSTEM will log the message "Command aborted" and return to the "ZSTEM?" prompt without sending any protocol messages. If the remote Kermit doesn't notice this, it still may be trying to send or receive the file or be in some unknown state. If the remote Kermit is a server, you can attempt a remote abort with the Finish command. See the section "Ending Server Mode".

The messages "File send aborted" and "File receive aborted" indicate that someone gave an abort command to ZSTEM or to the remote Kermit, or ZSTEM aborted the transfer because of some fatal error.

About Server and Non-server Kermits

ZSTEM implements both server and non-server Kermit. The basic version of Kermit requires you to give complementary commands to each computer before a file transfer can take place: a Send command on one computer requires a Receive command on the other computer. Server Kermit is an enhancement to the original Kermit that allows you to control the sending and receiving of files from your local computer.

When you put the host or remote Kermit in server mode, it takes all its file transfer commands in packets from the local Kermit program. You can also perform operating system commands on the remote server Kermit by giving generic server commands. See the section "Generic Server Commands".

When Both Ends Are Non-server Kermits

Before attempting any of the following Kermit commands, you must ensure that Kermit is started on the remote computer. When both the local and remote computers are running non-server Kermit, you must issue complementary Kermit commands on both machines. For example, each Send command must be matched by a Receive command on the other machine.

Sending Files

Sending a Single File

Before Sending a file to a remote Kermit, you must first have given the remote Kermit the Receive command. You can then press ALT+Z and reply to the prompts as follows:

```
ZSTEM? k
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: s
Local file? filename
Rmt file [local]?
```

Where *filename* is the file you want to send. The above will store the file at the remote end under the same name as on your PC.

If that name is not acceptable to your host, or you want to store it under a different filename, at the "Rmt file [local]?" prompt, type the new filename and press RETURN.

If the item **Use full file path names** is not enabled, only the simple filename (no directory) is sent to the remote system .

When ZSTEM finishes sending a file, it sounds the bell and returns to the KERMIT prompt.

Using Wildcards

You can send a group of local files to the remote Kermit using wildcard characters. First issue a Receive command to the remote Kermit. Then press ALT+Z and reply to the prompts as follows:

> **`ZSTEM? k`**
>
> **`Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: s`**
>
> **`Local file?`** ***`pattern`***
>
> Where *pattern* is a path/file name which contains the wildcards "*" or "?". ZSTEM will send all files that match the specified pattern.

If you want to send only some of the files which match the pattern, you can respond to the "Skip Until?" prompt as follows:

> **`Skip until?`** ***`filename`***
>
> ZSTEM will scan the directory for files that match the pattern you specified, but not send any until it finds the particular *filename*. Then it sends filename and all subsequent files that match pattern.

If the item **Use full file path names** is not enabled, only the simple filename (no directory) is sent to the remote system .

When ZSTEM finishes sending all files in the group, it sounds the bell and returns to the KERMIT prompt.

Using Indirect File Lists

You can send a group of local files to the remote Kermit using an indirect file list. First issue a Receive command to the remote Kermit. Then press ALT+Z and reply to the prompts as follows:

> **`ZSTEM? k`**
>
> **`Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: s`**
>
> **`Local file? <`** ***`listfile`***
>
> Where *listfile* is the name of a file which contains a list of the files you want to send, one on each line.

The list can specify that files be stored under different names. On the desired line(s) of the list, include a second filename separated by a space. The effect is similar to the preceding "Sending a Single File" section: the second name is the new filename.

The list can include wildcards. Any line of the list that includes a wildcard can have a second filename separated by a space. The effect is similar to the preceding "Using Wildcards" section: the first name is a pattern; the second is the specific skip-until filename.

If the item **Use full file path names** is not enabled, only the simple filename (no directory) is sent to the remote system.

Receiving Files

To receive one or more files from a remote non-server Kermit, you must first issue a Send command to your remote Kermit. You can then press ALT+Z and respond to the prompts as follows:

```
ZSTEM? k
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: r
Local path?
```

The above will store the file(s) in your PC under the same name as sent by the remote end.

If you want to store the file(s) in some particular drive and path but not rename them, at the "Local path?" prompt, type that path and press RETURN.

If you want to store a file under a different name, at the "Local path?" prompt, type that filename and press RETURN. If the remote sends more than one file, the second and following files will be saved under the names sent by the remote.

If the local filename doesn't conform to DOS rules, ZSTEM will respond with: "Invalid name/pattern" and prompt for local path again. If you want to abort the request, press RETURN followed by CTRL+Z. A received file may have the same name as a file already existing on your PC; see "Filenames" in the section "Kermit Configuration." If a received filename doesn't conform to DOS rules, ZSTEM will attempt to produce a valid name keeping as much of the sense of the received name as possible. If this fails, ZSTEM will reject the file with the error message: "Invalid/duplicate file name *localfile*."

You can use command type-ahead to type the entire command on one line. If you don't want to specify a local path or filename, include *:

```
ZSTEM? k r *
```

When ZSTEM finishes receiving a file, it returns to the KERMIT prompt.

When the Host Is a Server Kermit

Before attempting any of the following Kermit commands, you must ensure that Kermit is running in server mode on the host or remote end.

Once you have put the remote Kermit in server mode, you can give the file transfer commands Get and Send, or any generic server command.

Once you have finished transferring files, you can take the remote end out of server mode with the Finish command. If your host does not exit from server mode, you might need to use the Bye command as described in the section "Generic Server Commands".

Sending Files

Sending a Single File

To send a single file to the remote server Kermit, press ALT+Z and reply to the prompts as follows:

ZSTEM? k

Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: s

Local file? *filename*

Rmt file [local]?

Where *filename* is the file you want to send. The above will store the file at the remote end under the same name as on your PC.

If that name is not acceptable to your host, or you want to store it under a different filename, at the "Rmt file [local]?" prompt, type the new filename and press RETURN.

If the item **Use full file path names** is not enabled, only the simple filename (no directory) is sent to the remote system .

When ZSTEM finishes sending a file, it sounds the bell and returns to the KERMIT prompt.

Using Wildcards

You can send a group of local files to the remote Kermit using wildcard characters. Simply press ALT+Z and reply to the prompts as follows:

ZSTEM? k

Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: s

Local file? ***pattern***

Skip until?

Where *pattern* is a path/file name which contains the wildcards "*" or "?". ZSTEM will send all files that match the specified pattern.

If you want to send only some of the files which match the pattern, you can respond to the "Skip Until?" prompt as follows:

Skip until? ***filename***

ZSTEM will scan the directory for files that match the pattern you specified, but not send any until it finds the particular *filename*. Then it sends filename and all subsequent files that match pattern.

If the item **Use full file path names** is not enabled, only the simple filename (no directory) is sent to the remote system .

When ZSTEM finishes sending all files in the group, it sounds the bell and returns to the KERMIT prompt.

Using Indirect File Lists

You can send a group of local files to the remote Kermit using an indirect file list. Simply press ALT+Z and reply to the prompts as follows:

ZSTEM? k

Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: s

Local file? < ***listfile***

Where *listfile* is the name of a file which contains a list of the files you want to send, one on each line.

The list can specify that files be stored under different names. On the desired line(s) of the list, include a second filename separated by a space. The effect is similar to the preceding "Sending a Single File" section: the second name is the new filename.

The list can include wildcards. Any line of the list that includes a wildcard can have a second filename separated by a space. The effect is similar to the preceding "Using Wildcards" section: the first name is a pattern; the second is the specific skip-until filename.

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If the item **Use full file path names** is not enabled, only the simple filename (no directory) is sent to the remote system.

When ZSTEM finishes sending all files in the group, it sounds the bell and returns to the KERMIT prompt.

Receiving Files

To receive one or more files from a remote server Kermit, press ALT+Z and reply to the prompts as follows:

```
ZSTEM? k
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: g
Remote file? filename
Local path?
```

Where *filename* specifies the file(s) you want to receive from the host, in the format which the host expects. Some hosts may accept wildcards. The above will store the file(s) in your PC under the same name as that of the remote end.

If you want to store the file(s) in some particular drive and path but not rename them, at the "Local path?" prompt, type that path and press RETURN.

If you want to store a file under a different name, at the "Local path?" prompt, type that filename and press RETURN. If the remote sends more than one file, the second and following files will be saved under the names sent by the remote.

If the local filename doesn't conform to DOS rules, ZSTEM will respond with: "Invalid name/pattern" and prompt for local file again. If you want to abort the request, press RETURN followed by CTRL+Z. A received file may have the same name as a file already existing on your PC. See "Filenames" in the section "Kermit Configuration" for a description of this situation. It is possible that a received filename doesn't conform with DOS rules. ZSTEM will attempt to produce a valid name keeping as much of the sense of the received name as possible. If this fails, ZSTEM will reject the file with the error message: "Invalid/duplicate file name *localfile*."

When ZSTEM finishes receiving the file, it returns to the KERMIT prompt.

Using Indirect File Lists

You can get a group of files from the remote server Kermit using an indirect file list. Simply press ALT+Z and reply to the prompts as follows:

```
ZSTEM? k
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: g
Remote file? < listfile
```

Where *listfile* is the name of a local file which contains a list of the files you want to receive from the host, one on each line.

The list can specify that the file be stored under a different name. Include a second filename separated by a space. The effect is similar to the preceding "Receiving Files" section: the second name is the new filename.

Ending Server Mode

When you have finished transferring files, you need to give the "Finish" command to take the remote Kermit out of server mode. To do this, reply to the KERMIT prompt as follows:

```
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: f
```

The host should return to its normal state. When this happens, ZSTEM will return to the "ZSTEM?" prompt and you can press RETURN to resume normal terminal mode.

If the host does not respond to the "Finish" command, ZSTEM will retry (up to the error retry limit) and then log the error message: "Unable to shut down server." Some server Kermits do not recognize a "Finish" command and require that you send the Generic Server Command "Bye." See the section "Generic Server Commands".

Generic Server Commands

Generic server commands allow you to perform operating-system functions on the remote server Kermit machine. These commands are defined by the Kermit protocol. They allow you to perform file manipulation on a remote host without having to know the host's command language. These commands will only work if the remote server Kermit supports them.

To send a Generic Server Command to the remote Kermit, press ALT+Z and reply to the prompts as follows:

```
ZSTEM? k
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: c
Local or Remote command: r
Remote command?  command
```

Where *command* is a generic server command that conforms to the standard syntax rules, see Table 10.1.

Syntax rules for the generic server commands require that all operands are separated by blanks. For a null operand or an operand containing embedded blanks, type the

operand enclosed in quotes (" or '). The quotes will not be transmitted to the remote Kermit. There must be no quotes within a quote-delimited operand.

In table 10.1, optional operands are enclosed in brackets. The required part of the command operator is in capital letters.

For more details, refer to the "Kermit Protocol Manual" from Columbia University or the documentation for the server Kermit you are communicating with.

TABLE 10.1
Generic Server Commands

Bye	Shut down the server and log out.
COpy *source destination*	Copy the source file or file group to the destination file or file group.
CWd [*directory* [*password*]]	Change to new directory or reset to default directory if no operands are specified.
Dir [*filespec*]	List the remote directory.
Erase *filespec*	Delete the specified file or file group.
Help [*topic*]	Send Help information on the specified topic.
Host [*command*]	The given command is passed to the server's host command processor, and the resulting output is displayed on your screen.
Journal *command* [*argument*]	Control server transaction logging.
Kermit [*command*]	The given command, which is expressed in the server Kermit's own command syntax, is passed to the server for execution. This is useful for changing Kermit settings.
Login [*user* [*password* [*account*]]]	Change identity to that of a new user or remove user identity if no operands are specified.
Message *destination text*	Send a short message to the indicated user.
Program [*program-filespec* [*program-commands*]]	Run the specified program feeding it the specified commands.
Query	Give server status.
Rename *oldname newname*	Rename the specified file or file group.
Type *filespec*	Display the specified file or file group on the screen.
Usage [*area*]	Indicate amount of disk space used and amount available.
Variable *command* [*argument* [*argument*]]	Set or query a variable.
Who [*user* [*options*]]	List users who are logged in. If an operand is specified, provide detailed information on the specified user.

When ZSTEM Is a Server Kermit

You may want to make ZSTEM the server Kermit. This is usually done when you are transferring files between two computers running ZSTEM.

To make your PC function as a server Kermit, reply to the prompts as follows:

```
ZSTEM? k
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: ser
```

A remote Kermit can then issue SEND commands to send files to ZSTEM, GET commands to obtain files from ZSTEM, and the generic server commands in table 10.2 which ZSTEM will perform.

TABLE 10.2
Generic Server Commands Implemented in ZSTEM

CWd [*directory*]	Change to new directory or drive. If no operand is specified, display current directory.
Dir [*filespec*]	Send a directory listing, listing only matching file(s) if an operand is specified.
Erase *filespec*	Delete the specified file or file group.
Finish	Exit server mode and go back to ZSTEM command mode. Does not log out.
Rename *oldname newname*	Rename the specified file or file group.
Type *filespec*	Display the specified file or file group on the screen.
Usage [*drive*]	Indicate amount of disk space used and amount available.

Other Kermit Commands

Directory

The KERMIT Directory command lets you display directory information on any disk in your system. The directory listing displays the complete pathname, including the disk and subdirectories of the file(s) displayed. The listing includes filename, file size and creation date.

To display directory information, reply to the prompts as follows:

```
ZSTEM? k
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: d
File list? pathname
```

Where *pathname* is a drive designator, a wildcard specification, or a directory path name. You can specify several pathnames separated by commas.

For unspecified fields, ZSTEM assumes the asterisk (*) wildcard. However, if you include the period which separates the DOS name from the DOS extension, and leave the extension blank, ZSTEM will only select those files which have no extension.

If there is more than one screen of information, the display will pause and prompt you as follows:

```
Space for more, Return to quit...
```

DOS Commands

ZSTEM allows you to give DOS commands from within KERMIT. This is often useful for renaming files before performing a file transfer.

To give a DOS command from within Kermit, reply to the prompts as follows:

```
ZSTEM? k
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: c
Local or Remote command: l
System command? command
```

Where *command* is a DOS command.

ZSTEM will exit to DOS, perform the command, and return to the KERMIT prompt.

Menu Command

The Menu command is used to access the Kermit Configuration screen from within Kermit.

```
ZSTEM? k
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: m
```

You can also access this screen from the "ZSTEM?" prompt. Press C, SPACE, K, and RETURN.

Kermit Configuration

The Kermit protocol is used to transfer binary and text files between two computers. Before transferring a file, Kermit breaks it up into discrete groups, called packets. A Kermit packet consists of control fields for synchronization, sequencing and error detection, as well as a specified number of data characters.

Before two computers can transfer files, they must agree on the format and the way in which the files will be sent. The Kermit Configuration screen allows you to define the file, packet, character and communications format for your transfer. This must be the same format as that used by your remote computer.

ZSTEM initializes its Kermit configuration items to the most commonly used values. You may never need to change them!

The Kermit Configuration screen also contains fields that help you trace the data that Kermit is sending. See "Debugging Kermit" for more information.

Kermit gets its low-level communication parameters, such as baud rate and port, from the values on the Session Configuration screen. Kermit-level communications parameters are described in the "Kermit Communications Parameters" section in this chapter.

The configuration items in this section are all found on the Kermit Configuration screen. To access this screen, at the "ZSTEM?" prompt, press C, SPACE, K, and RETURN.

Kermit Files

File Types (Sending)

The Kermit protocol was originally designed to transfer text data. It was later extended to include the transfer of binary data.

You must tell ZSTEM what type of file you are going to send in the item **File type** on the Kermit Configuration screen. The choices are **Text, Binary**, and **Automatic**. When you are receiving a file, the remote Kermit tells ZSTEM what type of file it is about to send.

Text

Text files can be transferred between dissimilar systems. Kermit will take care of character conversion (carriage return, line feed) so that the transferred text is readable on the destination system.

Some software packages require a CTRL-Z to signal end of file. You can tell ZSTEM to insert a CTRL-Z (ASCII SUB) at the end of each file it receives. To turn on this feature, set item **Add Ctl-z at Text EOF** to **Y**. The default is **N**.

If ZSTEM encounters a CTRL-Z in a file it is sending, it will interpret it as the end of file marker. ZSTEM does not pass along the CTRL-Z to the remote Kermit.

Binary

Binary files typically consist of object code or executable programs. These files require all 8 data bits. On systems which have 8-bit communication, Kermit will send 8-bit characters. On systems that have only 7-bit communications, Kermit will translate characters with the 8th bit on, into two 7-bit characters. See the section "8th Bit Quote Character" for more details.

Automatic

If **File type** is set to **Automatic** (the default value), ZSTEM will scan the first 16KB in a file looking for zero bytes and bytes with the 8th bit set. If it finds any, the Kermit file type attribute will be set to binary, otherwise the file type will be set to text. If you use this value to send a file that has 8-bit characters, (and therefore it is sent as binary) no character translation is possible. When ZSTEM receives a file, and the remote Kermit has not sent a file type attribute, ZSTEM receives the incoming file as binary.

Temporary File Type Override

If you want to override the value of **File type** for a single Send or Get command, include the code B (Binary) or T (Text) on the Kermit command line.

Example:

```
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: B S
```

However, if the remote Kermit sends a file with a file type attribute, this attribute will supersede the values of both **File type** and your B or T codes.

The KERMIT status messages indicate the file type.

Transfer 2

Filenames

ZSTEM allows you to change the name of a file in the Send and Receive commands. It can also automatically change a filename during a receive operation if it already exists in the target directory. The item **Duplicate file name** determines how filename conflicts will be resolved.

Rename

This is the default. ZSTEM renames the new file so that both the new and the existing file can be in the same directory. The incoming file is renamed according to the following scheme:

If the filename extension is not three characters long, it is padded with "A"s. If the name still conflicts with an existing file, the last character of the filename extension is incremented until a unique filename is generated. (For example, MYFILE.DAT would change to MYFILE.DAU, MYFILE.DAV, MYFILE.DAW, etc.) If ZSTEM cannot generate a unique filename after trying this 25 times, it will abort the transfer and log the message: "Invalid/duplicate file name *filename*."

Overwrite

The existing file with the conflicting name is deleted.

Discard

Any incoming file whose name conflicts with an existing file will be discarded. The existing file will be retained.

Rename old

ZSTEM renames the existing file, using the same scheme as in the preceding Rename option.

While not a standard part of the Kermit protocol, ZSTEM will let you send and receive full path names rather than use the standard simple filenames. This can make it easier to send and receive files in multiple directories. To use this option, set item **Use full file path names** to **Y**. Be sure that the remote Kermit can also process full path names. The path name sent is simply the portion of the path that you specify; it is not a full path starting at the root.

Log Files

If you are transferring a large number of files, or running your file transfer unattended, you may want to send or "log" file transfer status information to a file. You can do this by specifying a filename in the item **Log file** on the Kermit Configuration screen. If the file already exists, ZSTEM will add the new log information to the end of the file.

Kermit Packets

Kermit breaks files into groups of information called packets. A packet is typically a sequence of characters arranged so that the beginning and end, and the location of various control and data fields, can be unambiguously identified. ZSTEM allows you to control some of the special characters in both the packets it receives and the packets it sends. You must ensure that the values that you enter agree with the values on the host.

Received Packets

The standard packet start character is ASCII SOH. If your host uses a different value, you must change the value of the item **Rx packet start char**. Type the ASCII symbol or the character's hex equivalent.

The maximum length packet that ZSTEM can receive from the remote Kermit is controlled by the value of the item **Rx packet length**. Its value is the length of the data portion of the packet, which is 6 bytes less than the actual transmitted packet. The default is 506. You may want to change this item to a lower value if you are sending files over noisy lines. The minimum value is 30 bytes. The maximum value which you should use in this item is 6 bytes less than your network packet size. Because the maximum network packet size which ZSTEM supports is 1024, the maximum value of this item is 1018. If the remote Kermit does not support long packets, and this item has a value greater than 94, ZSTEM will use 94-byte packets, the maximum short Kermit packet size.

ZSTEM Kermit will instruct the remote computer to timeout (or send a NAK back to ZSTEM) if it does not receive a packet in a certain period of time. This period of time is specified in the item **Rx timeout seconds**. The value can be between 0 and 94 seconds. A value of 0 is most often interpreted by other Kermits as meaning "don't time out".

Transmitted Packets

The standard packet start character is SOH (CTRL-A). If the host expects a different value, you must change the value of the item **Tx packet start char**. Type the ASCII symbol or the character's hex equivalent.

The standard packet end character is CR (CTRL-M). If the host expects a different character, you must change the value of the item **Tx packet end char**. If the remote Kermit does not need an end character, you can obtain a slight increase in speed by setting this item to **off**. (ZSTEM does need an ending character.) Type the ASCII symbol, or the character's hex equivalent, or **OFF**. Type **ON** to restore the previous character.

The maximum length of packet that ZSTEM will send to the remote Kermit is given in the item **Tx packet max length**. You may want to change this value if you are sending data over noisy lines. This value will only take effect if it is set before Kermit parameter negotiation takes place. The value must be between 30 and 1018. The remote Kermit will tell ZSTEM the maximum length of packet that it can receive. If the remote Kermit does not support long packets, and this item has a value greater than 94, ZSTEM will use 94-byte packets, the maximum short Kermit packet size. If your host is connected via LAT, you should limit the number of bytes sent at a time to 256. For this reason, the default **Tx packet max length** is **250**.

ZSTEM will timeout and send a NAK to the host if the host has not transmitted a packet in the period of time specified in the item **Tx timeout seconds**. This value is usually set by the host during Kermit's parameter negotiation. You only need to use this item if you wish to be able to timeout before parameter negotiation is completed. The timeout value can be between 0 and 30. A zero value will cause ZSTEM to only time out the remote Kermit after about one hour.

Attribute Packets

Some host Kermits cannot handle attibute packets. To prevent ZSTEM from sending any attribute packets, set the item **Attribute packets** to **N**.

Translating Characters

The Kermit protocol defines character translation. If you require, ZSTEM will translate between the host character set and your local PC character set.

How to identify your character sets and request translation is described in detail in the section "Translating Characters" in Chapter 9, "Simple File Transfer."

Because translation is only performed on files transferred as text, beware of using the default value **Automatic** in the item **File type** to send a file containing 8-bit Multinational codes. ZSTEM will incorrectly detect that the file is "binary" and defeat any character translation.

ZSTEM can perform the translation in cooperation with the remote kermit, according to the Kermit translation protocol. Or ZSTEM can perform the translation independently, and the remote is unaware.

Kermit Translation Protocol

When ZSTEM performs the translation according to the Kermit character translation protocol, both ends participate. There is a COMMON character set, defined by its "Registration" in line 11 of the translation table header. Several are possible, but

ZSTEM recognizes only two: ASCII (line 11 is blank), and ISO Latin 1 (line 11 contains "I6/100"). If the item **Translation** on the Kermit Configuration screen is set to **ISO Latin 1** (either directly, or via the **Automatic** value), ZSTEM uses the Kermit translation protocol.

ZSTEM Independent Translation

ZSTEM can perform translation independently, and the remote end is unaware. If the item **Translation** is not set to **ISO Latin 1** ZSTEM does not use the Kermit translation protocol. When ZSTEM transmits a file it does not tell the remote end about any translation that ZSTEM is doing. When ZSTEM receives a file to be translated, the remote end translation protocol should say nothing at all about the character set, or claim that the file is in the ASCII set.

Files transferred with the X/Ymodem protocol or simple disk read/write are only translated independently, if at all; translation is not part of the X/Ymodem protocol.

Kermit Characters

Kermit has several types of special characters. One of these is called a prefix character. If Kermit receives one of these prefix characters, it knows that it must perform special processing on the character(s) to follow. The Kermit Configuration screen allows you to change the default values of these characters if your remote Kermit has special requirements.

Control Characters

To avoid interference from communications channels and device drivers, the Kermit protocol translates each control character in the data it is transmitting to a two-character printable sequence consisting of a control prefix (quote character), normally the # character, followed by a printable ASCII character. CTRL-A becomes #A, the CRLF line terminator becomes #M#J, etc. The receiving Kermit will translate these two characters back to control characters upon reception.

If the remote Kermit uses a non-standard quote character, or if you are sending text with a very large number of # characters, you can change the control quote character to some other printable character. To do this, press the desired character in item **Control quote character**. If you specify a control quote character that is the same as either the compression character or the 8th bit quote character, a "Quote Conflict" error message will be displayed.

Compression Character

The Kermit protocol allows a special prefix encoding for repeated characters. Long strings of repeated characters will be prefixed by a special "compression character" for speedy transmission. You can change this character, or turn this feature off by changing the value of the item **Compression character**. You must press the desired character or type **OFF**. If the item is already set to off, you can type **ON** to restore the previously-used character.

If you try to set the compression character to the same character as the control quote or 8th bit quote characters, a "Quote Conflict" error message will be displayed.

8th Bit Quote Character

Eighth bit prefixing is a means of allowing 8-bit data to pass through a 7-bit communication channel. It does this by transforming characters with the eighth bit set into two characters. The character that is sent before the 7-bit portion of the character is the character specified in the item **8th bit quote character**.

The default value of **8th bit quote character** depends on the value of **Data bits** on the Session Configuration screen. If **Data bits** is set to 8, the default value of **8th bit quote character** is **off**. Otherwise the default value is **&**.

If you try to set the 8th bit quote character to the same character as the control quote or compression characters the "Quote Conflict" message will be displayed.

(If parameter negotiation with the remote Kermit concludes that 8th bit quoting is not allowed, ZSTEM will be forced to transfer all files as 7-bit and log a warning message for each file sent "WARNING: File being sent with 7-bit bytes.")

Pad Characters

The Kermit protocol allows you to send pad characters before the first character of a packet. This is sometimes useful when communicating with slow half-duplex systems. The pad character may be any control character; NUL and DEL are the most commonly used characters. ZSTEM will comply with the pad parameters requested by the remote Kermit during the parameter negotiation. However, because one or two packets must be sent before negotiation completes, you may have to set temporary parameters for ZSTEM to use during the initial negotiation.

If you need to send pad characters, in item **Number of pad chars** type a number between 1 and 50. ZSTEM will send no pad characters when this item is 0. In item **Pad character** type the character to be sent, or its hex equivalent, or its ASCII symbol.

Kermit Communications Parameters

Sliding Windows Protocol

ZSTEM negotiates Sliding Windows protocol with the remote Kermit; if the remote Kermit does not support this protocol, ZSTEM will not use it. Sliding Windows Kermit will perform significantly better than standard Kermit. The item **Window request** limits the number of unacknowledged packets. This item also shows a **Max** value which is two less than the number of transfer buffers available. ZSTEM allocates a maximum of 4K for transfer buffers; the actual number of buffers depends on the maximum of items **Tx packet max length** and **Rx packet length**. The actual window size used is the minimum of: the number requested, the **Max**, and the negotiation value sent by the remote Kermit.

If your host is connected via LAT, you should limit the number of bytes sent at a time to 256. This requires that **Tx packet max length** times **Window request** is less than 256.

Full/Half Duplex and Flow Control

Some hosts can communicate only in a half-duplex mode. After they receive a record, they send a turnaround character. Until they send this turnaround character, they ignore any further input. If you enable item **Half-duplex turnaround**, ZSTEM will wait for a turnaround character before it resumes sending. The item **Window request** must be **1**. The default turnaround character is XON. Type the character itself, or its hex equivalent, or its ASCII symbol or **OFF**. Type **ON** to restore the previous character.

If ZSTEM waits for and detects the turnaround character (because Half-duplex turnaround is set to other than **off**) it can wait for a further fixed interval before it resumes sending. You can select this interval in the item **Turnaround delay ms**. Type the desired interval in ms, 0 to 255. The default interval is 0.

Because the Kermit protocol never sends control characters within packets, Xon/Xoff flow control can be used if the remote host supports it, and the line is full duplex. Kermit packets are quite short, and flow control is usually not needed. If the item **Xon/Xoff flow control** is set to **Y**, flow control depends on the value of the item Protocol on the Session Configuration screen. If the item **Xon/Xoff flow control** is set to **N**, ZSTEM will not send Xoff.

The error message "Half-duplex conflict" or "Flow conflict" means you tried to enable both Xon/Xoff flow control and Half-duplex turnaround at the same time. You must turn one off before turning the other on. The error message "Window size conflict"

means you tried to enable Half-duplex turnaround when **Window request** was greater than 1.

Error Options

Any packets in which an error has been detected will be retransmitted. If many retransmissions occur, it may help to decrease the maximum packet size.

ZSTEM's Kermit has three ways of detecting the integrity of a packet. The item **Block check** will determine which method will be used, one of:

Sum-1 Simple one-byte checksum,

Sum-2 Simple two-byte checksum,

CRC 16-bit Cyclic Redundancy Check using CCITT polynomial.

In some cases, it is sufficient to use the default simple one-byte checksum; all Kermit implementations support this type. However, if you are using large (greater than 94 byte) packets, or the line is noisy, you should use one of the longer checksums, preferably **CRC**. Not all Kermit implementations support the longer checksums.

The item **Error retry limit** will determine how many errors ZSTEM will allow before aborting a file transfer. An error can be either a checksum error or a timeout error. If the error retry limit is reached, the message "Too many errors: command aborted" will be displayed. ZSTEM will reset the error counter each time a packet is successfully received. This message will also be displayed if the remote Kermit sent an error packet.

Debugging Kermit

Data Trace

ZSTEM provides a Kermit data trace option which you can use to debug communication problems. You can turn on data trace by setting item **Trace display** to **Data** or **Both**, or toggle it on and off during a file transfer by pressing CTRL+D. The trace information is written to the scroll area of the screen and to the log file if one is specified.

In the trace, ZSTEM shows:

normal ASCII characters as themselves,
control characters (01..1F and 7F) as <name>,
bytes with the 8th bit on (80..FF) as 'HH'.

Transmitted data appears in normal text, and received data in highlighted text (bold or inverse). A new line is started for each packet. Received characters are

interspersed with transmitted characters at the time of reception. Because Kermit is a half-duplex protocol, you will normally see a transmitted packet followed by a received packet.

A typical Kermit Transmitted ack packet appears as:

```
TxP: <SOH>#=Y[<CR>
```

Packet Trace

ZSTEM provides a Kermit packet and state trace which you can use to debug Kermit communication problems. You can turn on packet trace by setting item **Trace display** to **Packet** or **Both**, or toggle it on and off during a file transfer by pressing CTRL+T. The trace information is written to the scroll area of the screen and to the log file if one is specified. The trace has the following formats:

State-aa->aa	for every state change
Tx-t-nn	transmit packet type t, number nn
Rx-r-nn	receive packet type r, number nn

The nn fields are the packet sequence numbers. The aa fields are the current and new states. The state names are listed in table 10.3.

TABLE 10.3
State Names in a Kermit Packet Trace

SI	Send send-init packet
OF	Open file for sending
SF	Send file header
SA	Send attributes packet
SD	Send data (file contents)
SE	Send end-of-file
SB	Send end-of-transaction (end of current Kermit command)
RS	Receive server commands
SS	Send init packet (to a server)
SG	Send general command (to a server)
SR	Send receive-init packet (get command issued)
RI	Wait for send-init packet (receive command issued)
RF	Wait for file header or EOT
RA	Receive attributes packet
RD	Receive data (file contents)
Cp	Transaction completed (normally)
Ab	Abort transaction

Kermit Examples

The first example covers one of the most common uses of ZSTEM Kermit: downloading a file from your VAX running VMS. It assumes that you are sitting at your PC, and that you have already logged onto VMS with ZSTEM.

Receiving a File from a VAX Running VMS

```
$ kermit
VMS Kermit Version 1.0
Kermit-VMS>  send sample.dat
12:23:01 SENDING sample.dat  0 errors
```

ALT+Z

```
ZSTEM? k
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: r
Local path?
```

During the transfer, a status line will appear on your screen.

```
t mins 9.9 KBytes n packets transferred 0 retries 0 errors 0 timeouts
```

These lines will also be logged to your screen (or to a file if one is indicated):

```
12:23:14 Receiving sample.dat (binary)
45 byte packets  window-size 1 Sum-1  9.9 KByte  0.8 min
12:23:58 File receive done: 240 ch/sec  9.9 KByte  0 errors  0.9 min
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd:
ZSTEM?
Kermit-VMS> exit
```

Sending a File to a UNIX Server Kermit

The second example covers the more advanced use of ZSTEM with a host server. The remote host's Kermit must support the SERVER command and must respond to a FINISH command from ZSTEM. If it does not respond to the FINISH command, you can always use the BYE command. The BYE command will both shut down and log out the host server. The example assumes that you are sitting at your PC, and that you have previously logged onto UNIX with ZSTEM.

```
% kermit
C-Kermit, 4C(057) 15 Jan 89, 4.2 BSD
Type ? for help
C-Kermit> server
C-Kermit server starting.  Return to your local machine by
typing its escape sequence for closing the connection, and
issue further commands from there.  To shut down the
C-Kermit server, issue the FINISH or BYE command.
```

ALT+Z

```
ZSTEM? k
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: s
Local file? sample.dat
Rmt file [local]?
```

During the transfer, a status line will appear on your screen.

```
0 min left [■■■■    ] 0 retries 0 errors 0 timeouts
```

These lines will also be logged to your screen (or to a file if one is indicated):

```
10:02:41 Sending sample.dat (binary)
45 byte packets  window-size 1 Sum-1 13.9 KByte  1.4 min
10:03:40 File send done: 238 ch/sec 13.9 KByte  2 errors  1.4 min
```

```
Send, Get, Recv, SERv, Dir, Fin, Menu, Cmd: f
ZSTEM?
```

Introduction to Xmodem and Ymodem

Xmodem is a binary, transparent protocol for error-corrected file transfer. The Xmodem protocol was originally designed by Ward Christensen for the CP/M user's library. It has become a common standard for data transfer on PCs. The Xmodem protocol allows the interchange of any 7-bit or 8-bit data files.

Ymodem provides large packets and blockmode as well as filename, size, and date preservation. The Ymodem "go ahead" option for fast transmission on error-free channels is also included.

ZSTEM supports all features including multiple file (block) transfers, checksum and CRC (cyclic redundancy check) data checking plus local directory and file deletion.

In this manual, references to X/Ymodem apply to both Xmodem protocol and Ymodem protocol. Most of the configuration items referred to in this chapter are found on the X/Ymodem Configuration screen. To access this screen, at the "ZSTEM?" prompt, press C, SPACE, X, and RETURN.

Transfer 2

Using ZSTEM's XMODEM or YMODEM Command

Before using ZSTEM's XMODEM or YMODEM command you should do the following:

- Ensure you have properly configured ZSTEM to run X/Ymodem. See the section "X/Ymodem Configuration" for more details.
- Set up your host or remote computer so that it is running X/Ymodem. You may have to give an Xmodem or Ymodem command on the remote end before giving the complementary command on your local X/Ymodem.

The XMODEM or YMODEM Command

You can alternatively type the XMODEM command as YMODEM. They are the same command; the protocol is not determined by the way you type the command, it is determined by the item **Protocol option** on the X/Ymodem Configuration screen. In its examples, the manual uses both forms of the command, but you can interchange them.

You are now ready to give the ZSTEM command XMODEM on your local computer:

```
ZSTEM? x
```

ZSTEM will then offer you the following choice of X/Ymodem commands:

```
Send, Receive, Directory, Erase, or Menu:
```

Although the User Manual uses this long form of XMODEM command entry, you can always type the command on one line, avoiding the intermediate prompts. For example, at the "ZSTEM?" prompt, you can type **X S** *filename* and press RETURN.

The section "Sending Files with X/Ymodem" describes the use of the Send command. The section "Receiving Files with X/Ymodem" describes the use of the Receive command. The Directory, Erase, and Menu commands are described in the section "Other X/Ymodem Commands".

X/Ymodem Status Line

During X/Ymodem sends and most receives, a status line normally appears on your screen.

```
t min left [■■■    ]  n retries  n errors  n timeouts
```

The **min left** value and the progress indicator tell you how the transfer is proceeding. Each counter value n is reset to zero at the start of each file transfer. These counters have the following meanings:

retries — This is the number of errors that have occurred while transferring the current data block. If it reaches the value of item **Error retry limit**, (normally **10**) the transfer will abort. It is cleared to zero whenever a block is successfully transferred.

errors — This is the total number of errors; it is not reset during the transfer.

timeouts — This is the total number of timeout conditions that have occurred during the file transfer. It is not reset during the transfer. If timeouts occur repeatedly, the remote system may not be using the X/Ymodem protocol.

During X/Ymodem receives in which the file size is unknown (Xmodem protocol) a different status line appears on your screen. The **mins** value tells you the elapsed time since the transfer started.

```
t mins  n KBytes  n packets transferred  n retries  n errors  n timeouts
```

X/Ymodem Log

Before transferring each file, ZSTEM displays the following message:

```
hh:mm:ss  sending filename
protocol  packet-size  check  file-size  time-est
```

Where *protocol* is **XModem** or **YModem**, packet-size is either **1K-byte** or **128-bytes**, check is the error checking -- **checksum** or **CRC**, file-size is the size in Kbytes, and time-est is the estimated time in minutes.

As ZSTEM finishes transferring each file, it displays the message:

```
hh:mm:ss  File send done: ch/sec  file-size  errors  time-elapsed
```

Where *ch/sec* is the average throughput in characters per second.

If you are transferring a large number of files, you may want to send or "log" this information to a file. You can do this by specifying a value for **Log file** on the X/Ymodem Configuration screen.

Quiet Mode

If you are using a multitasking program such as DESQview or MultiLink, you might want to run file transfer in the background. For this, you should suppress X/Ymodem output to the screen. You can do this by specifying the quiet mode option when you give XMODEM commands. You must first configure your multitasking program, telling it that ZSTEM does not directly access the screen. After you start a quiet mode transfer, you can tell your multitasking system to switch to another task. A bell notifies you when the quiet mode transfer is complete. ZSTEM will remain in quiet mode until you select its task and press any key.

To transfer files in quiet mode, include "Q" in the ZSTEM XMODEM command line.

For example, the following lines put ZSTEM in quiet mode for the subsequent file send:

```
ZSTEM? x
Send, Receive, Directory, Erase, or Menu: q  s
File list?
```

Aborting X/Ymodem

ZSTEM allows you to abort the file transfer in progress. It can abort in the following ways:

- To abort the transfer and notify the remote end, press CTRL+X. If ZSTEM is receiving and the remote end does not accept the abort, it may continue to send the file, but ZSTEM will delete it.

- As a last resort, to abort the transfer without notifying the remote end, press CTRL+BREAK. ZSTEM will log the message "Command aborted" and return to the "ZSTEM?" prompt without sending any protocol messages. If the remote end doesn't notice this, it still may be trying to send or receive the file or be in some unknown state.

If item **Abort on remote request** is set to **Y**, ZSTEM will abort if requested to do so by the remote system. It will display the message "Remote abort." Set this item to **N** to disregard abort requests from the remote system.

Sending Files with X/Ymodem

Before attempting to send a file, you must ensure that X/Ymodem is running on the remote computer. With the Xmodem protocol, you can send only a single file. With the Ymodem protocol, you can send a single file, several files, or an indirect list of files.

Single File

To send a single file to the host, you must issue a Receive command to the remote X/Ymodem. **Protocol option** can be set to **XModem**, **XModem-1K**, or **YModem**. You can then press ALT+Z and reply to the prompts as follows:

```
ZSTEM? x
Send, Receive, Directory, Erase, or Menu: s
File list? filename
```

Where *filename* is the file you want to send.

As with other ZSTEM commands, you can shorten the above steps to: **X S** *filename*.

ZSTEM waits for an initial negative acknowledgement (NAK) from the host. After it receives the NAK, ZSTEM sends the file using the X/Ymodem single file transfer protocol. When file transmission is in progress, the status line is updated to show the time left and progress indicator.

When the send is complete, ZSTEM returns to the "ZSTEM?" prompt.

Several Files

To send several files to the host, you must issue a Receive command to the remote Ymodem. **Protocol option** must be set to **YModem**. You can then press ALT+Z and reply to the prompts as follows:

```
ZSTEM? y
Send, Receive, Directory, Erase, or Menu: s
```

`File list? *filename filename filename*`

Type the *filenames*, separating them with spaces. Or type one or several filenames containing the wildcards "*" or "?". (A blank filename or file extension field is not considered to be a wildcard.)

ZSTEM will send the name of the first file and wait for a NAK. After it receives the NAK, ZSTEM sends the first file using the Ymodem block transfer protocol.

All matching files will be sent. When the transfer is complete, ZSTEM returns to the "ZSTEM?" prompt.

Indirect List of Files

To send the files named in an indirect list, you must issue a Receive command to the remote Ymodem. **Protocol option** must be set to **YModem**. You can then press ALT+Z and reply to the prompts as follows:

`ZSTEM? y`

`Send, Receive, Directory, Erase, or Menu: s`

`File list?  < *listfile*`

Where *listfile* is an indirect file which contains a list of the files you want to send, one on each line. The list can include wildcards.

When the transfer is complete, ZSTEM returns to the "ZSTEM?" prompt.

Receiving Files with X/Ymodem

Before attempting to receive a file, you must ensure that X/Ymodem is running on the remote computer. In the X/Ymodem protocol, you can receive either a single file, or a group of files.

If you select **YModem-G** ("go ahead") in the item **Protocol option**, the remote end must support Ymodem-G. You are inviting it to send the entire file and only check for errors at completion. This method significantly speeds up the transfer when using an error-free channel. The other values of this item, **XModem**, **XModem-1K**, and **YModem** are all equivalent when ZSTEM is receiving files. ZSTEM will match whatever the remote end uses for the sending protocol.

To receive files, you must first give a Send command at the remote end. You might specify multiple files, usually with wildcard characters. You can then press ALT+Z and reply to the prompts as follows.

```
ZSTEM? x
Send, Receive, Directory, Erase, or Menu: r
```

There are three ways you can reply to the "File list?" prompt:

`File list? *`
If the remote end is Xmodem, one or several received files are named XMODEMRX.*NNN* where *NNN* is chosen so that the name does not conflict with existing files. If the remote end is Ymodem, received files are named by the remote end.

`File list?` ***`filename`***
If the remote end is Xmodem, the first (or only) received file is named filename; subsequent received files are named XMODEMRX.*NNN* where *NNN* is chosen so that the name does not conflict with existing files. If the remote end is Ymodem, the first (or only) received file is named filename; subsequent received files are named by the remote end.

`File list?` ***`pathname`***

If the remote end is Xmodem, one or several received files are named *pathname*\XMODEMRX.*NNN* where *NNN* is chosen so that the name does not conflict with existing files. If the remote end is Ymodem, received files are named by the remote end in the directory pathname.

Your PC sends an initial NAK. The log line contains the name of the received file. When the files have been received, ZSTEM returns to the "ZSTEM?" prompt.

Other X/Ymodem Commands

Directory Command

The XMODEM Directory command lets you display directory information on any disk in your system. The directory listing displays the complete pathname, including the disk and subdirectories of the file(s) displayed. The listing includes filename, file size and creation date.

To obtain a directory listing, reply to the prompts as follows:

`ZSTEM? x`

`Send, Receive, Directory, Erase, or Menu: d`

`File list?` ***`pathname`***

Where *pathname* is a drive designator, a wildcard specification, or a directory path name. You can specify several pathnames separated by commas.

For unspecified fields, ZSTEM assumes the asterisk (*) wildcard. However, if you include the period which separates the DOS name from the DOS extension, and leave the extension blank, ZSTEM will only select those files which have no extension.

If there is more than one screen of information, the display will pause and prompt you as follows:

`Space for more, Return to quit...`

Erase Command

The XMODEM Erase command lets you delete selected files from any disk in your system.

To delete a file, reply to the prompts as follows:

ZSTEM? x

Send, Receive, Directory, Erase, or Menu: e

File list? *filename*

Where *filename* is one or more files you want to delete.

For unspecified fields, ZSTEM assumes the asterisk (*) wildcard. (myfile is equivalent to myfile.* , * equivalent to *.*, C: equivalent to C:*.*) This differs from the XMODEM Send and Receive functions.

However, if you include the period which separates the filename from the extension, and leave the extension blank, ZSTEM will only select those files which have no extension: (myfile.   C:*.)

For safety, ZSTEM does not delete the files immediately. For each file, it prompts you with:

Erase "d:\pathname\filename.ext" (N):

To leave this file and skip to the next file, press RETURN.

To erase the indicated file, press Y and RETURN.

To erase this file and all the remaining files which match your file specification, press * and RETURN.

To quit the Erase function, Press any other character.

Menu Command

The Menu command is used to access the X/Ymodem Configuration screen from within the XMODEM command.

ZSTEM? x

Send, Receive, Directory, Erase, or Menu: m

You can also access this screen from the "ZSTEM?" prompt. Press C, SPACE, X, and RETURN.

X/Ymodem Configuration

XMODEM takes its low-level communications parameters, such as baud rate and port, from the Session Configuration screen. Other X/Ymodem-level parameters are taken from the X/Ymodem Configuration screen.

To access this screen, at the "ZSTEM?" prompt, press C, SPACE, X, and RETURN.

Protocol

The item **Protocol option** determines the particular X/Ymodem protocol used in a transfer. The values have different effects if you are sending or receiving files.

Protocol Options for Sending Files

The following values for the item **Protocol option** have effect when ZSTEM is sending a file.

XModem
This value can send only a single file, in 128 byte blocks. ZSTEM will pad the unused portion of the last block with CTRL-Z.

XModem-1K
This value allows a larger 1K byte packet to be sent, increasing the speed over channels with a low error rate. The packet size will fall back to 128 bytes if the error rate becomes too high. ZSTEM will pad the unused portion of the last block with CTRL-Z.

YModem or **YModem-G**
This value can send multiple files. It preserves the size and creation-date of files, and can also preserve the filename. It uses 1K byte packets of data, falling back to 128 bytes if the error rate becomes too high.

Protocol Options for Receiving Files

The following values for the item Protocol option have effect when ZSTEM is receiving a file.

XModem or **XModem-1K** or **YModem**
All these values are equivalent when receiving a file. The actual options are determined by the sender and negotiation.

YModem-G
This value invites the sender to send the entire file without error correction. If an error is detected, the transfer fails, but the block is not retransmitted. This method can be very rapid but requires an error-free channel.

Number of Data Bits

X/Ymodem file transfers normally assume that the file contains binary data and transfer all 8 bits. X/Ymodem requires that the sending computer, the receiving computer and the interconnecting network transmit and receive 8-bit data including all control characters. For this reason, some microcomputers, mainframes, and packet switched networks will not work with X/Ymodem. It is best suited for file transfer between microcomputers connected locally or over a standard dial-up network.

Some host systems will normally operate in 7-bit mode, but will switch to 8-bit mode when using X/Ymodem. If your communications port has been configured for 7 data bits, ZSTEM will temporarily override the value of **Data bits** on the Session Configuration screen while using Xmodem. This is useful for some time-sharing services such as CompuServe.

Handling X/Ymodem Errors

ZSTEM's XMODEM can use two types of error checking: CRC (Cyclic Redundancy Check) and checksum. The CRC method is more reliable than the checksum method. Some older versions of Xmodem, however, only support the checksum method. X/Ymodem versions that support both CRC and checksum will first attempt to use CRC. The error detection mechanism is specified by the receiver. The receiver will first try the CRC mode. If the sender does not respond within a timeout interval, the receiver switches to checksum mode. This timeout interval varies from version to version. Because it is usually too short, you should start the sender before you start the receiver. However, if you want to use checksum mode, you should start the

receiver first, wait for the timeout interval (the receiver will then switch to checksum mode) and then start the sender.

The item **CRC mode selection character** determines the character which is to be used as the CRC selection character. Press the character itself, or its hexadecimal equivalent, or its ASCII symbol.

The item **Error retry limit** specifies the maximum number of consecutive errors that will be tolerated during a file transfer, after which the transfer is aborted. Valid entries are 1 through 255. The default value is 10.

The item **Block wait time seconds** specifies the time in seconds that ZSTEM will wait for the next block of data after it has acknowledged the previous block. The valid entries are 1 through 255. The default value is 7 seconds.

Translating Characters

If necessary, ZSTEM will translate between host character sets and your local PC character set. If the file contains text which you want to translate, you must set the item **File type** on the X/Ymodem Configuration screen to the value **Text**. You can request translation and identify your character sets as described in the section "Translating Characters" in Chapter 9, "Simple File Transfer."

Debugging X/Ymodem

ZSTEM provides an X/Ymodem data trace which you can use to debug communication problems. You can turn on data trace by setting item **Trace display** to **Data**, or you can toggle trace display on and off during a file transfer by pressing CTRL+D. The trace information is written to the scroll area of the screen and to the log file if one is specified.

The data trace shows:

Normal ASCII characters as themselves.
Control characters (01..1F and 7F) as <name>.
Bytes with the 8th bit on (80..FF) as 'hh'.

Transmitted data appears in normal text, and received data in highlighted text (bold or inverse). A new line is started for each packet. Each new packet starts with Rx: or Tx:.

X/Ymodem Examples

The following examples show you how to use the X/Ymodem protocol to transfer files to and from a Bulletin Board System (BBS).

Sending a File to a BBS

You must first prepare the BBS to receive a file. For example, your BBS might require the following:

```
Command (?=help): RECEIVE
A)scii, X)modem, XC)modem-CRC, K)ermit
Transfer Type: A X XC K (?=help): XC
XMODEM/CRC transfer
Filename: SAMPLE1.DAT
Ready to receive "Sample1.dat"
Start now, or Control-X's to abort
```

You must then tell ZSTEM to send the file. Press ALT+Z to enter command mode, and at the "ZSTEM?" prompt enter:

```
ZSTEM? x
Send, Receive, Directory, Erase, or Menu: s
File list? sample.dat
```

During the transfer, a status line will appear on your screen.

```
0 min left [■■■    ] 0 retries 0 errors 0 timeouts
```

The following will also be logged to you screen (or to a file if you have indicated one):

```
4:14:11pm sending sample.dat
XModem  128-byte  CRC  1024 bytes  0.2 min
4:14:25pm File send done: 73 ch/sec  1024 bytes  0 errors  0.2 min
```

When the file transfer is complete, you will be returned to the "ZSTEM?" prompt.

Receiving a File from a BBS

The following example shows you how to receive a block of files from a BBS using the Xmodem protocol.

You must first prepare the BBS to send the files. Assuming you want your PC to receive the files GEORGE.DAT and HARRY.DAT, your BBS might require the following:

```
Command (?=help): SEND
A)scii, X)modem, XC)modem-CRC, Y)modem, K)ermit
Transfer Type: A X XC K (?=help): Y
YMODEM/CRC transfer
File(s): *.DAT
Ready to send "*.dat"
Start now, or Control-X's to abort
```

You must then prepare ZSTEM to receive the files. Press ALT+Z to enter command mode, and at the "ZSTEM?" prompt enter:

```
ZSTEM? y
Send, Receive, Directory, Erase, or Menu: r
Filename? *
```

During the transfer, a status line will appear on your screen.

```
0 min left [■■■   ] 0 retries 0 errors 0 timeouts
```

The following will also be logged to your screen (or to a file if one is indicated):

```
5:10:59pm receiving george.dat
XModem 128-byte CRC 1Kbytes 0.2 min
5:11:12pm File receive done: 88 ch/sec 1152 bytes 0 errors 0.2 min

5:11:12pm receiving harry.dat
XModem 128-byte CRC 2Kbytes 0.4 min
5:11:32pm File receive done: 90 ch/sec 1792 bytes 0 errors 0.3 min
```

Chapter

11

Softkeys

Introduction

A softkey is any keyboard key to which you have assigned a special definition. When you press this key, ZSTEM executes its special softkey definition instead of processing it normally. ZSTEM allows you to assign a softkey definition to almost any key on your keyboard. Softkey definitions allow you to automate often-repeated tasks such as logging on to your host.

You can create and edit softkey definitions with ZSTEM's SOFTKEY command. Softkey definitions include: characters you want to send to the host, local ZSTEM commands, and special softkey instructions. Softkey instructions allow you to control the execution of your softkey: pause for a specified period of time, wait for a response from the host, branch to other softkey definitions, read and match keyboard input, and more.

This chapter begins with a simple softkey example. The next section, "Using Softkeys", tells you how to choose a key, and then edit and save its softkey definition. The remainder of the chapter describes ZSTEM's softkey instructions and special softkey features.

A Simple Softkey Example

Most softkeys are short: typically not more than five lines in length. ZSTEM, however, does not limit the length of your softkey. A softkey can be as simple or as complex as you require. The following short example assigns a simple sequence of commands to CTRL+V. Like most softkeys, it uses only a few of the special softkey editing keys.

To start defining this softkey example:

- At the "ZSTEM?" prompt, type **SOFTKEY** and press RETURN. You can shorten this to **SO**.
- ZSTEM responds with

  `Select key...`

  Press the key to which you want to assign a softkey definition. In this example it is CTRL+V.
- ZSTEM then displays an empty Softkey Definition screen, as shown in figure 11.1. The words "edit" and "insert" appear at the top of the screen indicating that you can use softkey editing keys, and that you are in insert mode.

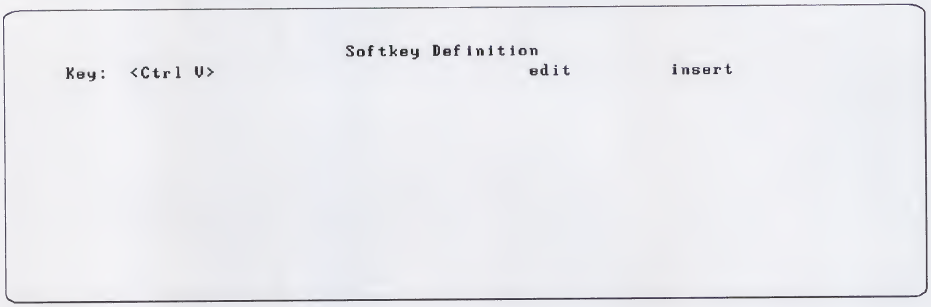


Figure 11.1. Empty Softkey Definition screen

Now type the body of your softkey definition, following the steps in the left column below. Use the ARROW keys and BACKSPACE to move the cursor around the screen and make corrections if required. After you perform this example, you will be able to configure your terminal to "VT100" in the middle of a session, merely by pressing CTRL+V.

The following steps show you the actual keys to press, and their result when the softkey is executed. If at any time you want to quit without saving the softkey, press CTRL+BREAK.

To produce the example softkey, press these keys:	Effect when softkey example is complete and you press CTRL+V:
ALT+Z	Go into ZSTEM command mode.
C, RETURN, G, RETURN	Access the General Configuration screen.
ALT+B	(This has no effect when the softkey is executed; it only causes a new line on the Softkey Definition screen.)
1, 0, RETURN, SPACE, SPACE, SPACE	Select item 10 **Terminal mode** on the General Configuration screen. Highlight the third value **VT100** in this item.
RETURN, RETURN, RETURN	• Make **VT100** the value of **Terminal mode**, • return to the "ZSTEM?" prompt, • return to emulation mode.
ALT+B	(This has no effect when the softkey is executed; it only causes a new line on the Softkey Definition screen.)
set term/device_type=vt100 RETURN	Because the softkey is back in emulation mode, this VMS command is sent to the host, telling it that you are a VT100 terminal. If you correctly entered your definition this far, your softkey definition screen should now look like figure 11.2.
ALT+T	Finish your softkey definition and assign it to the key you indicated at the start.

Now, in emulation mode, in the middle of a session with a VAX host, you can configure your terminal to "VT100", merely by pressing CTRL+V. This softkey

definition remains assigned to CTRL+V until you assign something else to that key, or exit from ZSTEM without saving the current softkeys.

```
                                Softkey Definition
   Key:  <Ctrl V>                                  edit          insert
<Cmnd Mode> c <Return> g <Return> <NL>
10 <Return> <space>   <Return> <Return> <Return> <NL>
set term/device_type=vt100 <Return>
```

Figure 11.2. Completed Softkey Definition screen

You have now created your first softkey definition! The following sections tell you how to use the more advanced features of ZSTEM's SOFTKEY command.

Using Softkeys

You can have many softkey definitions, and each can be virtually unlimited in length. The only restriction is that the total amount of memory used by softkey definitions can be no more than 25 Kbytes. The exact number of bytes available for softkeys can be displayed using the MEMORY command.

This section describes the steps involved in creating a softkey definition. It first explains the keys and key combinations that can be assigned definitions. These keys are described in detail in table 11.1. It then explains how to edit your softkey definition, and the special keys that can be used to help you during editing. Lastly it describes how to end your editing session, either retaining your definition or discarding it.

The following section, "Softkey Instructions", describes the different types of softkey instructions available for your definition. Table 11.19 at the end of this chapter also contains a comprehensive summary of softkey instructions.

Choosing a Key

You must start your softkey definition by choosing the key to which you want to assign a definition. You can assign a definition to almost any key on the keyboard including BACKSPACE. Many keys will also form valid combinations with SHIFT, CTRL, or ALT allowing you to assign different definitions to each combination. Table 11.1 is a comprehensive list of available keys.

Softkeys

TABLE 11.1
Keys Eligible to be Softkeys

F1 - Fn	You can assign softkey definitions to the function keys, both alone and with SHIFT, CTRL or ALT. ZSTEM may already have used some of the combinations to map the VT F11 to F20 keys to your PC keyboard. Refer to the keyboard layout figures in Chapter 7. You can assign definitions to even more combinations of the function keys. ZSTEM provides up to fifteen Control Function (CF) combinations and up to fifteen Special Function (SF) combinations. How you obtain these functions depends on your keyboard: KEA PowerStation keyboard CF1 to CF15 CTRL+F6 to CTRL+F20 SF1 to SF15 ALT+F6 to ALT+F20 or CTRL+SHIFT+F6 to CTRL+SHIFT+F20 IBM Enhanced keyboard CF1 to CF12 CTRL+ALT+F1 to CTRL+ALT+F12 SF1 to SF12 SHIFT+ALT+F1 to SHIFT+ALT+F12 Standard XT or AT keyboard CF1 to CF10 CTRL+ALT+F1 to CTRL+ALT+F10 SF1 to SF10 SHIFT+ALT+F1 to SHIFT+ALT+F10
A - Z, 0 - 9	You can assign definitions to all of these keys alone, and with SHIFT, CTRL and ALT. Although most ALT-alphabetic keys perform special functions during softkey editing, you can still assign definitions to those combinations. An ALT-alphabetic key with a softkey definition will continue to perform its editing function during softkey editing, but will act as a regular softkey at other times. Refer to table 11.15. You can define ALT+Z to be other than the command-mode key; when you delete the definition, ALT+Z will return to its original function. You can assign the command-mode function to any key. (Be careful if you assign a softkey definition to both the upper and lower case of an alphabetic key; you will lose that key! For example, if you assign to both E and SHIFT+E, you will not be able to give the EXIT command!)
Numeric Keypad, Editing Keypad, Cursor keys	These keys emulate the VT keypad keys. You can assign a definition to any of these keys. You can also assign a definition to their CTRL combinations, although the CTRL-keypad keys will duplicate the editing and cursor keys. You cannot assign to their SHIFT or ALT combinations. ALT-keypad is reserved for generating special character codes, the same as in DOS.

TABLE 11.1 (Continued)

BACKSPACE, ESC, RETURN, SPACE, TAB	You can assign a definition to any of these keys. If you do, ZSTEM will ignore the definition when in command mode; in terminal mode or while you are actually editing a softkey definition, ZSTEM will treat it as a softkey.
punctuation keys	You can assign a definition to these keys, and to their SHIFT and ALT combinations. Only some keys can be combined with CTRL.
NUMLOCK	You can assign a definition to this key, on all keyboards except XT.
CAPSLOCK	Not eligible.
SHIFT, CTRL, ALT	Not eligible as individual keys. Only in combination with other keys.
PRTSC, PRINT SCREEN	You can assign a definition to this key. If you press it while you are editing a softkey, you will get an immediate print-screen. If you want a print-screen to occur when the softkey is executed, rather than immediately, press ALT+I before pressing the normal print-screen request. (The actual key combination for a text print-screen depends on your keyboard type; refer to Chapter 8, or the keyboard layout figures in Chapter 7.)
BREAK	You can assign a definition to the break-to-host signal, but not in combination with SHIFT, CTRL or ALT. Users often define BREAK to send several breaks, making the break signal longer.

The "Keyless" Softkeys

Several other ZSTEM commands require you to enter a softkey definition. As no particular key is associated with these softkeys, they are called keyless softkeys. The keyless softkeys are produced by the commands: LINEDROP (Chapter 4), STARTUP (Chapter 11), PHONE (Chapter 12), ANSWERBACK, PRIMARY, and SECONDARY (Chapter 14). Editing these softkeys is just like editing regular softkeys.

Softkeys

Entering and Editing Your Softkey Definition

To create a softkey definition, or edit an existing definition:

- At the "ZSTEM?" prompt, type **SOFTKEY** and press RETURN. You can shorten this to **SO**.
- ZSTEM responds with

  ```
  Select key...
  ```

  Press the key to which you want to assign a softkey definition, or change an existing definition. You can press a key alone or with SHIFT, CTRL or ALT. See table 11.1 for available keys.
- ZSTEM displays the Softkey Definition screen, showing the key to which this definition will be assigned. If this key already has a definition, it will be shown. The word "edit" appears at the top of the screen. An example of the Softkey Definition screen is shown in figure 11.1.
- You must then enter the body of the definition. You can intersperse regular text with special softkey instructions. Characters other than the normal ASCII printing set will appear on the display as phrases in angle brackets, for example:

  ```
  <Ctrl G>,<Alt J>,<Return>, Keypad 1>,<Space>
  ```

  The SPACE bar can also appear as a blank, depending on the surrounding text. You will probably want to use some of the special softkey editing keys described in table 11.2. You should read the section "Softkey Instructions" to familiarize yourself with the instructions you can use in your definition. You can use BACKSPACE to correct your mistakes.

When you execute a softkey, the text in the definition will be sent just as if you typed it at your keyboard. ZSTEM will interpret and execute any special softkey instructions you use according to the logic described in the section "Softkey Instructions."

If your keyboard does not provide a needed character, you can generate that character's code by holding down ALT while you type its decimal code on the keypad.

Special Editing Keys

When editing a softkey definition, the word "edit" normally appears at the top of your screen. When this word appears, you can use the arrow and keypad keys to move the cursor around, insert replace and delete characters, and erase from the cursor to the beginning or end of the softkey. The keypad must not be in NumLock

mode. The special editing keys are shown in table 11.2. This table tells you which VT keys to use. Most PC keyboards map these VT keys onto the indicated PC keys; the exact mapping for various keyboards is given in Chapter 7.

Two other indicators may appear at the top of the screen: "<more" indicates that there is more softkey text preceding that displayed; "more>" indicates that there is more text following that displayed.

Finishing the Definition

When you are through editing your softkey definition, press ALT+T. ZSTEM checks for syntax errors, stores your softkey definition and returns to the "ZSTEM?" prompt. You can now use the softkey. If you want to use this softkey while running ZSTEM at another time, you must save it before you exit the ZSTEM program; refer to "Saving and Loading Your Softkey Definitions" in this chapter.

If a syntax error is found, the cursor is placed at the error, and an error message is shown. You should correct the error and then retry ALT+T. Possible errors are given in table 11.18.

Quitting Your Editing Session

You can get out of your editing session without causing any change to that key or its definition:

- Press CTRL+BREAK.
- If you had made any changes, ZSTEM responds with

```
Abort edit, or Continue edit (C)...
```

  Press A.

TABLE 11.2
Special Editing Keys

VT function	Usual PC key	Effect in Softkey Editing
LEFT ARROW	LEFT ARROW	Moves the cursor a single character left.
RIGHT ARROW	RIGHT ARROW	Moves the cursor a single character right.
UP ARROW	UP ARROW	Moves the cursor a single line up.
DOWN ARROW	DOWN ARROW	Moves the cursor a single line down.
PREV SCRN	PG UP	Moves back a page.
NEXT SCRN	PG DN	Moves forward a page.
FIND	HOME	Moves the cursor to the beginning of the definition.
SELECT	END	Moves the cursor to the end of the definition.
INSERT HERE	INS	Toggles insert mode on and off. On: the characters you enter displace existing characters without deleting them. This is the default mode. The word insert appears at the top of the screen. Off: the characters you enter overwrite existing characters.
REMOVE	DEL	Deletes the character at the cursor, or the instruction to the right of the cursor.
CTRL+FIND	CTRL+HOME	Deletes the definition from its beginning, to the cursor.
CTRL+SELECT	CTRL+END	Deletes the definition from the cursor, to the end.
ALT+E	ALT+E	Toggles the above special editing keys off and on.
ALT+H	ALT+H	Displays a summary of softkey instructions on the screen.
ALT+I	ALT+I	Inserts the as-marked value of the following special editing key, or the following key which has a definition already assigned.
ALT+T	ALT+T	Finish editing your softkey definition.

Deleting a Softkey Definition

To delete a softkey definition, and allow the key to return to its normal function, you must delete the entire contents of any previous definition.

- At the "ZSTEM?" prompt, type **SO** and press RETURN.
- ZSTEM responds with

  ```
  Select key...
  ```

  Press the key whose definition you want to delete.
- ZSTEM displays the Softkey Definition screen, and the current definition assigned to that key. The word edit appears at the top of the screen.
- Press FIND to move to the beginning of the softkey and then CTRL+SELECT to erase to the end of the softkey. (These keys are marked HOME and CTRL+END on a PC keyboard). This deletes the entire definition.
- Press ALT+T. This ends your new "definition". The key now has no definition assigned to it, and returns to its original function.

Softkey Instructions

ZSTEM's softkey instructions are very powerful. They allow you to wait for specific input from the keyboard or the host, pause for a specified period of time, test for the success or failure of different instructions, branch to other softkey definitions, and more.

Input/Output Instructions

Comments or Remarks

The <Remark> instruction lets you insert comments, or remarks, in your softkey definition. These remarks will be displayed during softkey execution but will have no actual effect on the execution.

TABLE 11.3
Special Editing Instructions

To enter instructions...	Press keys...	Description
<Remark>	ALT+R	Start a remark or comment. The following string up to the next <NL> is displayed on the screen during execution. If executed in command mode, the string is ignored.

Processing from the Host

There are some terminal parameters, such as Insert/Replace Mode, which can only be set by escape sequences. ZSTEM provides a special softkey instruction that lets you store a string and process it as if the string came from the host. Refer to table 11.4.

TABLE 11.4
Softkey "Double Remark" Instruction

To enter instructions...	Press keys...	Description
<Remark><Remark>	ALT+R ALT+R	Two adjacent <Remark> instructions cause the following string up to the next <NL> to be processed as if it came from the host. Not to be confused with a single <Remark> as explained in the above section.

Reading the Keyboard

When the executing softkey encounters the <Keyboard> instruction, the softkey pauses and reads characters from the keyboard until you press RETURN or ALT+Z. The collected characters are then substituted in place of the <Keyboard> symbol in the definition, and the softkey continues, "executing" the keyboard-entered characters. The RETURN or ALT+Z is discarded.

In this context, an ALT+Z does not cause ZSTEM to enter command mode. If you need a CR character following the keyboard entered text, merely put <Return> in the softkey definition itself after the <Keyboard> instruction.

The success/fail flag is set to success if the keyboard input ended with RETURN; it is cleared to fail if the input ended with ALT+Z. There is no timeout during a <Keyboard> instruction.

This instruction is especially useful if you want to automate a file transfer. When the softkey executes, you need to enter only the filename to be transferred. It is also useful for log-in operations. You can put all dialing, connect, and sign-on information into a softkey definition, but obtain the password from the keyboard.

TABLE 11.5
Softkey Keyboard Instruction

To enter instructions...	Press keys...	Description
<Keyboard>	ALT+K	During execution, read keyboard input until RETURN or ALT+Z is pressed, and execute the input as part of the softkey definition.

Softkeys

External Parameters

Softkeys can access DOS command line parameters and DOS environment variables.

DOS command line parameters are strings, following the ZSTEM program name on the command line, delimited by spaces, and not starting with the switch character. If a parameter is enclosed in quotes, it can have embedded spaces and even start with the switch character. You can have up to nine parameters. For example, in the following DOS command line, vaxa is parameter 1, and account name is parameter 2.

```
> zstem320 /c:config.cfg vaxa "account name"
```

To obtain a DOS command line parameter in a softkey, use the <Parameter n> instruction. The parameter will be substituted for the instruction. The success/fail flag will be set to success if the parameter was present on the command line, fail if it was not. To test only the existence of a parameter, and not substitute the parameter in the softkey definition, use the <Parameter n> <Defined> combination. The success/fail flag will be set to success if the parameter was present on the command line, fail if it was not.

You can access DOS environment variables in a softkey. Enclose the environment variable name in a pair of <Env> instructions. The success/fail flag is set based on the existence of the variable. For example, if the environment variable has been defined as:

```
set host=vaxa
```

Then vaxa will replace <Env>host<Env> in the executing softkey.

To test the existence of the variable without substituting the variable in the softkey definition, use the combination <Env>variable<Env> <Defined>. On execution this will set the success/fail flag and not use the variable itself.

TABLE 11.6
Softkey External-Parameter Instructions

To enter instructions...	Press keys...	Description
<Parameter *n*>	ALT+I ALT+*n*	On execution, the DOS command line parameter n will be substituted for <Parameter *n*>. The number *n* can be 1 to 9.
<Env>	ALT+I ALT+E	To access a DOS environment variable, enclose the variable name in a pair of <Env> instructions.
<Defined>	ALT+I ALT+D	Use this after a <Parameter *n*> or <Env>variable<Env> to set the success/fail flag to success if a parameter or environment variable is defined. The parameter or variable itself will not be used.

Logical Instructions

Waiting

ZSTEM has two different WAIT instructions: <Wait> and <Wait *nn*>.

When an executing softkey encounters a <Wait> instruction, it will use the current **Default softkey wait time**. You can inspect and change this interval on the Keyboard Configuration screen, or with the WAITIME command. You can create a softkey and later, without changing the definition, change the overall softkey timing by using WAITIME.

Softkeys

To display or change the Default softkey wait time:

- At the "ZSTEM?" prompt, type **WAITIME** and press RETURN. You can shorten this to **WAI**.
- The following prompt will be displayed:

  ```
  Default softkey wait time (nS)?
  ```

  If you want to retain the value n, press RETURN. If you want to change it, enter a new value in the range .1 to .9 seconds, or 1 to 600 seconds, and press RETURN.
- The following prompt will be displayed:

  ```
  Default softkey match timeout (nS)?
  ```

  This value is used while matching strings from the host or keyboard; it is described later in this chapter. Press RETURN.

When an executing softkey encounters a <Wait *nn*> instruction, it will suspend execution for *nn* seconds.

TABLE 11.7
Softkey Wait Instructions

To enter instructions...	Press keys...	Description
<Wait>	ALT+W, 0, 0	Suspend execution for a fixed time. The duration is the value of "default softkey wait time" during execution. You can change this value with the WAITIME command.
<Wait *nn*>	ALT+W, n, n	Suspend execution for *nn* seconds. The characters *nn* can be .1 to .9 or 01 to 99 seconds.

Branching

A softkey definition can contain 20 numbered labels. The instruction <Goto *nn*> does an unconditional branch to a label. There is a success/fail flag which is conditionally set by various operations. The instructions <Succeed goto *nn*> and <Fail goto *nn*> branch to a numbered label, according to the current state of the success/fail flag.

The state of the success/fail flag is determined as follows:

- After a <Decrement, test 0> instruction, the flag indicates success if the counter is 0, fail if non-zero. After a <Query *nn*> instruction, the flag indicates success if the counter is equal to *nn*, fail otherwise.
- After a match function, the flag indicates success (match obtained) or failure (timeout).
- After a <Keyboard> instruction, the flag indicates success if the input ended with a RETURN, fail if the input ended with ALT+Z.
- After a <Remote> instruction, the flag indicates success if the executing softkey was invoked by the host, fail if it was started by a local key-press.
- After a <Defined> instruction, the flag indicates whether the DOS command line parameter or environment variable was defined or not.
- After an XMODEM or KERMIT file transfer, the flag indicates the success or failure of the transfer.
- After a GET softkey file (merge option), the flag indicates whether the file was successfully loaded or not.

TABLE 11.8
Softkey Branching Instructions

To enter instructions...	Press keys...	Description
<Label *nn*>	ALT+L, n, n	Declare a label within the softkey definition. You can define 20 labels, 00 through 19.
<Succeed goto *nn*>	ALT+S, n, n	Branch to the label *nn* if the success/fail flag is in success state.
<Fail goto *nn*>	ALT+F, n, n	Branch to the label *nn* if the success/fail flag is in fail state.
<Goto *nn*>	ALT+G, n, n	Branch to the label *nn* unconditionally.

The Counter

There is a counter which you can use to control looping within a definition. The instruction <Set number *nn*> loads this counter, the instructions <Query *nn*> and <Decrement, test 0> test the counter and set the success/fail flag.

TABLE 11.9
Softkey Counter Instructions

To enter instructions...	Press keys...	Description
<Set number *nn*>	ALT+N, n, n	Set the loop counter to the value *nn*, exactly two decimal digits. The special value 00 will set the counter to 256.
<Query *nn*>	ALT+Q, n, n	Compare the loop counter with the value *nn* and set the success/fail flag to success if the counter is exactly *nn*.
<Decrement, test 0>	ALT+D	Decrement the loop counter and set the success/fail flag according to the result. If the decremented counter is zero, the flag is set to success.

Matching Strings From the Host

In the host match function, the softkey waits for a specified string-pattern from the host. You could use this function to wait for a response from your modem, the network, or the host system before you transmitted more text.

The host match function appears in a softkey definition as the sequence

```
<Match, t/o> string <Match end>
```

where string represents a string of up to 80 characters.

The softkey waits until the characters arriving from the host match with this string, or the timeout expires. The success/fail flag indicates the result. The following shows the typical sequence of a host match function followed by a conditional branch. If the timeout expires, the softkey branches to label *nn*.

```
<Match, t/o> string <Match end> <Fail goto nn>
```

The string may contain the wildcard symbol <?> which matches a single character, or the wildcard symbol <Arb> which matches an arbitrary number of characters.

You can extend the host match function to contain up to 16 different strings. The following example shows three strings.

```
<Match, t/o> string1 <Succeed goto L1>
 string2 <Succeed goto L2>
 string3 <Match end> <Succeed goto L3>
```

Characters from the host are compared with all three strings at the same time. If a match is obtained, the success/fail flag is set to success, and the definition branches

to one of the labels L1 L2 or L3. If no match has been found when the **Default softkey match timeout** expires, the success/fail flag is cleared to fail, and the definition continues without branching.

Do not use <NL> anywhere between the <Match,t/o> and the <Match end>.

The match is normally case sensitive i.e. the received characters must match the upper and lower case of the string. If you want to ignore case in a particular string, use the <AnyCase> instruction immediately before the string. For example, in the following host match:

```
<Match,t/o 10>DOG<Succeed goto 11>
<AnyCase>cat<Match end> <Succeed goto 12>
```

the first string would only match DOG but the second would match CAT, cAT, etc.

When an executing softkey encounters a <Match, t/o> instruction without an explicit timeout, it will use the current **Default softkey match timeout**. You can inspect and change this interval on the Keyboard Configuration screen or with the WAITIME command. You can define a softkey and later, without changing its definition, change the overall softkey timing merely by using WAITIME.

To display or change the **Default softkey match timeout**:

- At the "ZSTEM?" prompt, type **WAITIME** and press RETURN. You can shorten this to **WAI**.
- The following prompt will be displayed:

  ```
  Default softkey wait time (nS)?
  ```

  This value is used for the <Wait> instruction described elsewhere in this chapter. Press RETURN.
- The following prompt will then be displayed:

  ```
  Default softkey match timeout (nS)?
  ```

  This value is the interval that will be used wherever the <Match, t/o> instruction occurs without an explicit timeout. If you want to retain the value n, press RETURN. If you want to change it, enter a new value in the range .1 to .9 seconds, or 1 to 600 seconds, and press RETURN.

TABLE 11.10
Softkey Host-match Instructions

To enter instructions...	Press keys...	Description
<Match, t/o>	ALT+M, 0, 0	Begin the host match function. The timeout is the **Default softkey match timeout** set by the WAITIME command.
<Match, t/o *nn*>	ALT+M, n, n	Alternative instruction to begin the host match function. The characters *nn* represent the timeout. They can be .1 to .9 or 01 to 99 seconds.
<Match end>	ALT+M, ALT+M	End the host match function.
<?>	ALT+U	A wildcard which matches any single character. You can use it in a string.
<Arb>	ALT+A	A wildcard which matches as many characters as necessary (including none) to make the entire match succeed. You can use it inside a string.
<AnyCase>	ALT+I, ALT+C	Make the host match case-insensitive. Use this combination immediately before a string. Without this instruction, matches are case-sensitive.

Matching Strings From the Keyboard

Keyboard entered data can be substituted directly, or compared with a string-pattern.

If you couple the <Keyboard> instruction with a match function, you have a keyboard match function. You can then match keyboard-entered characters with one or more strings. With this function, your softkey definition could offer a menu of choices to the user.

A typical keyboard match function with one string appears as follows. If the timeout expires, the definition branches to label *nn*.

```
<Keyboard> <Match, t/o> string <Match end> <Fail goto nn>
```

Or, you can match up to 16 different strings. The following example shows three strings.

```
<Keyboard> <Match, t/o> string1 <Succeed goto L1>
 string2 <Succeed goto L2>
 string3 <Match end> <Succeed goto L3>
```

When the keyboard match function is executing, you enter characters from the keyboard. You can erase characters with BACKSPACE. The function will accept and display any character which is a potential match. It will "beep" a key that matches none of the strings. You don't have to press RETURN at the end of input. As soon as a match is obtained, the success/fail flag is set to success, and the definition branches to one of the labels L1, L2 or L3.

If no match is found and the timeout expires, the success/fail flag is cleared to fail, and the definition continues without branching.

Whether or not ZSTEM prompts for the keyboard input depends on the mode of ZSTEM (terminal mode, command mode, local help) at the time the keyboard match is executed. In normal terminal mode, ZSTEM will prompt with "Input?" on the 25th line. At completion of the match, this prompt and its response will be erased and the emulation screen restored. In either command mode or local help mode, ZSTEM will not prompt for input. The "ZSTEM?" prompt or lines you may have displayed while in local help mode should be sufficient.

TABLE 11.11
Softkey Keyboard-match Instructions

To enter instructions...	Press keys...	Description
<Keyboard><Match, t/o *nn*>	ALT+K, ALT+M, n, n	Begin the keyboard match function. During execution, read keyboard input and match it with one or more following strings. You must follow the string(s) with <Match end>. The characters *nn* represent the timeout. They can be .1 to .9 or 01 to 99 seconds.
<Keyboard><Match, t/o>	ALT+K, ALT+M, 0, 0	Alternative instruction to begin the keyboard match function. The timeout is the **Default softkey match timeout** set by the WAITIME command.

Softkeys

Special Editing Instructions

The following special instructions have been designed to make the editing and reading of softkey definitions easier.

TABLE 11.12
Special Editing Instructions

To enter instructions...	Press keys...	Description
<NL>	ALT+B	Go to a new line on the screen. It is ignored when executed.
<VCom>	ALT+V	Start a comment. The following string up to the next <NL> is treated as a comment and ignored when executed.
<Remark>	ALT+R	Start a remark. The following string up to the next <NL> is displayed on the screen during execution. If executed in command mode, the string is ignored.

Change-Mode Instructions

Within a definition, there can be instructions that change the mode of an executing softkey. One invokes command mode. The other ends the executing softkey. Refer to table 11.13.

TABLE 11.13
Special Mode Instructions

To enter instructions...	Press keys...	Description
<Cmnd Mode>	ALT+Z	Go into ZSTEM command mode when executed.
<Exit>	ALT+X	Exit the softkey when executed; effect is the same as reaching the end of the definition.

Softkeys

Using Other Softkeys in a Definition

The <Jump> instruction allows you to nest one softkey definition inside another. Refer to table 11.14.

When you are editing a softkey definition, some keys may already have a softkey definition. Even the ALT-alphabetic keys that have special editing functions can also have a softkey definition. It may be necessary to specify the "level" of the key you want. That is, you might want the as-marked value of a key, or its softkey definition, or its special editing function. Table 11.15 tells you how to specify these levels.

Do not confuse a key (most of which are marked with a character) with a character. When a softkey is executing, it may encounter a character in a string, and the key which happens to be marked with that character has a softkey assigned to it. In this case, the executing softkey merely executes that character. It does not expand, or jump-to, or do anything with the definition assigned to that character.

TABLE 11.14
Softkey Jump Instruction

To enter instructions...	Press keys...	Description
<Jump><key>	ALT+J	Call another softkey definition from within an executing softkey. Enter literal key appears at the bottom of the screen. When the softkey is executed, it will jump to the definition assigned to this key. The loop counter and success/fail flag are passed. When this definition exits, execution continues in the original definition.

TABLE 11.15
Specifying the "Level" of Keys During Softkey Editing

Type of key	To insert the "as marked" value of this key into your definition:	To insert the softkey definition (if any) assigned to this key into your definition:
Keypad or alt-alphabetic keys having some special editing function.	Press ALT+I then the key.	Press ALT+Y then the key.
The particular key which you are defining.	Press the key itself.	Press ALT+O to insert the definition which existed prior to the one you are now editing.
All other regular keys, and shift or ctrl combinations	If the key does not have a definition assigned to it, just press the key itself. If it does have a definition, press ALT+I and then the key.	Press the key itself.
Keyless softkeys (those having no actual "key" associated)	Not Applicable.	Press ALT+Y followed by: A for ANSWERBACK L for the LINEDROP softkey P for the PHONE setup S for the STARTUP softkey 1 for Primary Attributes 2 for Secondary Attributes

Saving and Loading Your Softkey Definitions

When you finish editing your softkey definition with ALT+T, that definition will immediately take effect. If you want to be able to use the softkeys you have just created the next time you run ZSTEM, you will need to SAVE them. You may want to view all currently-defined softkeys before saving them.

Viewing the Current Definitions

The TYPE command can display and print all softkey definitions. This includes both the regular softkeys which you have defined, and the keyless softkeys.

To display all current softkey definitions:

- At the "ZSTEM?" prompt, type the following: **TYPE** and press RETURN. The following prompt will be displayed:

```
Print keys also (N):
```

- To only display the softkeys, press RETURN.

  or

  To display and print the softkeys, press Y, RETURN. The softkey definitions will be printed on the device you have configured as your text printer. Refer to Chapter 8, "Printer."

Saving Your Softkey Definitions

After you have defined softkeys, you will want to save these definitions for future use. You can use the SAVE command to save only the current softkey definitions, both regular and keyless.

- At the "ZSTEM?" prompt, type **SAVE** and press RETURN. You can shorten this to **SA**.
- At the prompt:

  ```
  Program, Softkeys, or Configuration (C):
  ```

  Press S, RETURN.
- At the prompt:

  ```
  Softkey file name (.key)?
  ```

  Type the filename you want for your softkey definition file.

A file containing the current softkey definitions will be written to disk.

You could combine the above steps as: **SA S** *filename*.

With the SAVE command you can also save the configuration including all softkey definitions, or an image of the entire program including all softkey definitions. The different uses of SAVE are described in the section "Saving Your Options" in Chapter 3.

Softkeys

Loading Previously-Saved Definitions

The GET command can load a new set of softkey definitions into the running ZSTEM. This includes the regular and keyless softkeys. To load softkeys from a previously-saved file of definitions:

- At the "ZSTEM?" prompt, type **GET** and press RETURN.
- At the prompt:

  ```
  Config/Softkey file name (.key)?
  ```

  Type the filename of the softkey definition file, and press RETURN. ZSTEM responds with:

  ```
  Merge or Replace (R):
  ```

- To delete all of the current softkeys, including the keyless softkeys, before loading the new set, press RETURN.

  or

  To merge the new softkeys into the current set, press M, RETURN. If the new set of softkeys includes definitions assigned to any key in the current set, the new definition will overwrite the old .

You could combine the above steps as: **GET** *filename* **M**.

The GET command also allows you to load a new configuration that includes softkey definitions. This use of the GET command is described in "Starting ZSTEM with Your Saved Options" in Chapter 3.

You can issue the GET command as part of a softkey definition, just as you can issue other ZSTEM commands. You should realize that a GET command issued in a softkey definition can delete the softkey definition that issued it!

- If you chose to merge the new softkeys with the existing softkeys, and the running softkey is not replaced, softkey execution will continue. However, if it is replaced, softkey execution will be terminated and ZSTEM will remain in command mode.
- If you chose to replace the existing softkeys, all existing softkeys are deleted and ZSTEM will be in terminal mode.

If the softkey file is too large to load, the message "Softkey file too large" will appear. If you had chosen the replace option, nothing will have been loaded. If you had chosen the merge option, the softkeys in the new file are merged until the next softkey definition does not fit.

Additional Features

Automatic Softkey on Startup

A softkey which is automatically executed on startup could automatically log onto a remote system, set special configurations, display help information, or perform any other initialization.

You can execute one of several softkeys on startup. It can be the special "keyless" softkey (not associated with any key) which you define with the STARTUP command, or any softkey definition you assign to one of the 36 keys ALT+0 through ALT+9, and ALT+A through ALT+Z.

STARTUP Softkey

To define or change the special STARTUP softkey:

- At the "ZSTEM?" prompt, type **STARTUP** and press RETURN. You can shorten this to **ST**. If the STARTUP softkey has been previously defined, the previous definition will appear on the screen.
- You edit the STARTUP softkey definition in the same way as a regular softkey. You can abort the editing by pressing CTRL+BREAK. You can delete the STARTUP softkey definition by deleting the entire definition.
- Press ALT+T to finish the definition.
- SAVE ZSTEM using the methods in "Saving Your Options," Chapter 3.

When you invoke this new version, the STARTUP softkey definition will be executed.

Startup Switch I

The command line switch I is called the startup switch. It allows you to specify one of 36 different softkeys to be executed on startup. An argument between 00 and 09 executes the corresponding softkey between ALT+0 and ALT+9. An argument between 10 and 35 executes the corresponding softkey between ALT+A and ALT+Z. You must have saved a configuration or ZSTEM program image that contains that softkey definition.

For example, the following command invokes ZSTEM and executes the softkey definition assigned to ALT+2:

```
> zstem320 /:i02
```

The switch I is considered "on" if you include the startup switch on the command line when you invoke ZSTEM. If you SAVE a ZSTEM version that has I on, that version always has I on. You can set I "off" in a version that was saved with I on if you include /i with no argument on the command line.

The following defines which softkey, if any, is automatically executed when ZSTEM starts:

- If the I switch is "on," then the definition assigned to the specified key ALT+0 through ALT+Z is executed, assuming that you have assigned a definition to that key.
- If the I switch is off, and the STARTUP softkey has been defined, then the STARTUP softkey is executed.
- If the I switch is off, and the STARTUP softkey has not been defined, then no softkey is executed.

Softkeys Invoked by the Host System

Softkeys are normally executed when you press the assigned key on the keyboard. The host, however, can send a control sequence to your PC, causing it to execute a softkey. When a softkey is invoked in this way, it is called a remote softkey.

Remote softkeys let the host control ZSTEM. For example, the host could change ZSTEM baud rates and other configuration items which a host could not otherwise change. Using remote softkeys the host could set up a file transfer. Only the softkeys ALT+0 through ALT+9 and ALT+A through ALT+Z are eligible to be invoked as remote softkeys. The control sequence which invokes them is:

ESC [4;n.z

If n is between 0 and 9, the corresponding softkey between ALT+0 and ALT+9 is executed. If n is between 10 and 35, the corresponding softkey between ALT+A and ALT+Z is executed. In an eight-bit environment, you can use:

CSI 4;n.z

For example, the received sequence CSI 4;11.z will cause ZSTEM to execute the softkey definition you have assigned to ALT+B.

If you are emulating a VT52 (not ANSI) terminal, the control sequence is:

ESC t ***nn***

where *nn* must be exactly two digits.

The softkey will be executed when the control sequence is received. However, if ZSTEM is currently executing another softkey, the control sequence will be queued in the keyboard buffer.

If you want to disable remote softkeys, set the item **Remote Softkeys** on the General Configuration screen to **N**.

The <Remote> instruction allows you to test whether an executing softkey was invoked by a local key press, or by the host. Table 11.16 gives details.

TABLE 11.16
Softkey Test-remote Instruction

To enter instructions...	Press keys...	Description
<Remote>	ALT+I, ALT+R	Test whether the executing softkey was invoked by the host. The flag is set to success if it was, or fail if it was started by a local key press. If a host-invoked softkey does a <Jump> to another softkey, that softkey too will test as "invoked by host."

Softkeys

PHONE Softkeys

ZSTEM's special PHONE command is a quick and easy method of storing and dialing frequently used modem numbers. It allows you to define the modem command sequence that will precede all of the numbers you dial, create a personal directory of telephone numbers and special commands, and physically place a call through your modem. This command is described in detail in Chapter 12.

The PHONE command defines two "keyless" softkeys, the phone dir softkey and the phone setup softkey. In addition, any softkey program can retrieve the last phone number that was looked up in a PHONE request with the <phone number> softkey instruction.

TABLE 11.17
Softkey Phone Instruction

To enter instructions...	Press keys...	Description
<Phone number>	ALT+P	During execution, replace this instruction with the last phone number that was looked up with the PHONE command.

Configuration Menus

If your softkey definition gives the CONFIGURE command, the configuration menus will be displayed. This will cause your screen to appear to flash as the menus are quickly drawn and redrawn. You can avoid this flashing by using the !CONFIGURE command.

The !CONFIGURE command can be used in a softkey just like the CONFIGURE command. The only difference between the two commands is that in !CONFIGURE, the Configuration screen will not appear.

The HELP screen does not appear during softkey execution, regardless of the value of the item **Automatic command mode menu** . If, however, <Cmnd Mode> is the final instruction in your softkey, and **Automatic command mode menu** is set to **Y**, the HELP screen will be displayed.

Intercharacter Delay

The host may be unable to accept softkey-generated characters (which appear to be coming from the keyboard of your "terminal") as fast as the baud rate allows. If so, you can instruct ZSTEM to delay a few milliseconds between each character, rather than send the characters at the normal baud rate. The item that controls this is **Intercharacter delay** on the Session Configuration screen. You can set the delay in milliseconds to a value in the range 0 to 255. This item also affects the sending rate of transmitted files.

Aborting a Running Softkey

A softkey which is executing can be aborted by pressing CTRL+BREAK. ZSTEM responds with a beep, terminates the execution, and returns to terminal mode. This is handy when you are testing softkeys which contain long <Wait> instructions.

Error Messages

ZSTEM will analyze your softkey definition for errors after you have finished editing it, and have given the ALT+T instruction. If a syntax error is found, the cursor is placed at the error, and one of the error messages in table 11.18 appears. You should then correct the error and try ALT+T again.

TABLE 11.18
Softkey Definition Syntax Error Messages

Error message	Meaning
Label is not defined	The label *nn* in the <Goto *nn*> is undefined.
Duplicate label	Labels must have unique numbers.
Match string too long	Counting <Arb> as one character, the entire match string must not exceed 80 characters.
<Arb> at pattern end	You cannot start or end a match string with an <Arb> since there is an implicit one at the beginning, and one at the end would match no characters. This error also occurs within a match string if you use <Succeed goto *nn*> with no following string.
Invalid char in Match	Only extended ASCII characters (0 to 255), <Arb>, and <?> can appear in a match string.
Two <Arb>s in a row	Two <Arb>s in a row are invalid because the second <Arb> would match no characters.
<Arb/?> outside Match	<Arb> and <?> have no meaning outside a match string. An unpaired <Match end> also causes this error.
Match null/doesn't end	The match string is null, or there is no terminating <Match>.
Too many subpatterns	There are more than 16 strings within a match.

Summary of Softkey Instructions

The following is a comprehensive list of softkey instructions.

TABLE 11.19
Summary of Softkey Instructions

Instruction	Produced by	Description
<?>	ALT+U	A wildcard which matches any single character.
<AnyCase>	ALT+I, ALT+C	Make the host match case-insensitive.
<Arb>	ALT+A	A wildcard which matches as many characters as necessary (including none) to make the entire match succeed.
<Cmnd Mode>	ALT+Z	Enter ZSTEM command mode when executed.
<Decrement, test 0>	ALT+D	Decrement the loop counter and set the success/fail flag according to the result. If the counter reaches zero, the flag is set to success.
<Defined>	ALT+I, ALT+D	Used after a <Parameter *n*> or <Env>*variable*<Env> to set success/fail flag if parameter or environment variable is defined.
<Env>	ALT+I, ALT+E	Insert the DOS environment variable enclosed in a pair of <Env> instructions.
<Exit>	ALT+X	Exit when executed; effect is the same as reaching the end of the definition.

TABLE 11.19 (Continued)

Instruction	Produced by	Description
<Fail goto *nn*>	ALT+F, n, n	Branch to the label *nn* if the success/fail flag is in fail state.
<Goto *nn*>	ALT+G, n, n	Branch to the label *nn* unconditionally.
<Jump><key>	ALT+J	Call another softkey definition from within an executing softkey.
<Keyboard>	ALT+K	Read keyboard input until return or ALT+Z is pressed, and execute the input as part of the softkey definition.
<Keyboard><Match, t/o *nn*>	ALT+K, ALT+M, n, n	Begin the keyboard match function. The timeout is *nn.*
<Keyboard><Match, t/o>	ALT+K, ALT+M, 0, 0	Begin the keyboard match function. The timeout is the **Default softkey match timeout**.
<Label *nn*>	ALT+L, n, n	Declare a label within the softkey definition.
<Match end>	ALT+M, ALT+M	End the host match function or keyboard match function.
<Match, t/o *nn*>	ALT+M, n, n	Begin the host match function. The timeout is *nn.*
<Match, t/o>	ALT+M, 0, 0	Begin the host match function. The timeout is the **Default softkey match timeout**.
<NL>	ALT+B	Break to a new line on the screen.
<Parameter *n*>	ALT+I, ALT n	Insert the DOS command line parameter *n.*
<Phone number>	ALT+P	During execution, replace this instruction with the last phone number that was looked up with the PHONE command.
<Query *nn*>	ALT+Q, n, n	Compare the loop counter with *nn* and set the success/fail flag to success if the counter is exactly *nn.*
<Remark>	ALT+R	Start a remark. The following string up to the next <NL> is displayed.

TABLE 11.19 (Continued)

Instruction	Produced by	Description
<Remark><Remark>	ALT+R, ALT+R	Two adjacent <Remark> instructions cause the following string up to the next <NL> to be processed as if it came from the host.
<Remote>	ALT+I, ALT+R	Test if invoked by remote.
<Set number *nn*>	ALT+N, n, n	Set the loop counter to the value *nn*.
<Succeed goto *nn*>	ALT+S, n, n	Branch to the label *nn* if the success/fail flag is in success state.
<VCom>	ALT+V	Start a comment. The following string up to the next <NL> is treated as a comment and ignored when executed.
<Wait *nn*>	ALT+W, n, n	Suspend execution for *nn* seconds.
<Wait>	ALT+W, 0, 0	Suspend execution for the **default softkey wait time**.
editing keys	ALT+E	Toggle special editing keys off and on.
get definition	ALT+Y	Insert definition of the accompanying special editing key or the accompanying "keyless" code.
help	ALT+H	Display a summary of softkey instructions on the screen.
immediate	ALT+I	Insert as-marked value of: the following special editing key, or the following key which has a definition assigned.
old definition	ALT+O	Insert the definition previously assigned to the key you are now editing.
terminate	ALT+T	Finish editing your softkey definition.

Softkeys

Examples

There are some short examples of softkey definitions in the section "Keyboard Remapping" in Chapter 7.

The two examples which follow are softkey definitions which use logical instructions. Both examples are shown as they would appear on your Softkey Definition screen if you copied the example for yourself. For simplicity, the examples show the entire definition on the screen at once. In fact, it will not fit on your screen at once; your screen will scroll as you type.

Remember, you do not type the softkey instructions in the <brackets>. Table 11.19 will help you recall which ALT-key combinations you press to produce the various instructions.

Softkey to Dial a Host

The example in figure 11.3 uses a Hayes type of modem to dial a host. You would invoke it by pressing ALT+2 while ZSTEM was in terminal mode. When it executes, the softkey sends the modem atze1v1 which clears the modem, and sets echo and verbose mode on. Then it waits for the modem's usual OK response. Then it sends the modem atdt 555-0000 and waits for the modem's connect response. If it does not get this response, the example attempts to dial twice more. If successful, the example displays Successful connection on the screen and exits in terminal mode. This softkey definition would be suitable to run at startup. You could run it by saving the configuration, and invoking this ZSTEM configuration with the I startup switch as follows:

```
> zstem320 /i:02
```

```
                              Softkey Definition
   Key:  <Alt 2>                                    edit          insert        >more
<NL>
<VCom> *** SOFTKEY TO DIAL YOUR HOST <NL>
<NL>
<VCom> *** INITIALIZE YOUR MODEM <NL>
atze1v1 <Return> <NL>
<NL>
<VCom> *** WAIT FOR YOUR MODEM TO RESPOND <NL>
<Match, t/o  5> <AnyCase> ok <Match end> <NL>
<Succeed goto  1> <NL>
<NL>
<VCom> *** IF MODEM DOES NOT RESPOND EXIT <NL>
<Remark> Modem Not Responding <NL>
<Exit> <NL>
<NL>
<VCom> *** TRY THREE TIMES TO DIAL AND CONNECT <NL>
<Label  1> <NL>
<Set number  3> <NL>
<NL>
<Label  2> <NL>
<Wait  1> <NL>
atdt 431-8664 <Return> <NL>
<Match, t/o 60> <AnyCase> connect <Match end> <NL>
<Fail goto  3> <NL>
<NL>
<VCom> *** SUCCESSFUL CONNECTION - EXIT <NL>
<Remark> Successful connection <NL>
<Exit> <NL>
<NL>
<VCom> *** CONNECT UNSUCCESSFUL DECREMENT COUNTER AND LOOP <NL>
<Label  3> <NL>
<Decrement, test 0> <Fail goto  2> <NL>
<NL>
<VCom> *** FAILED TO CONNECT AFTER THREE TRIES - EXIT <NL>
<Remark> Could not connect to host after three tries <NL>
<Exit> <NL>
```

Figure 11.3. Softkey Example to dial a host

Softkeys

Softkey to Login to a Host

The example in figure 11.4 logs on to a host and runs a program. You would invoke it by pressing ALT+1 while ZSTEM was in terminal mode. When it executes, the softkey sends the host a CR to get its attention, and waits for the VMS "Username:" prompt. Then it sends the account name HTEST and a CR, and waits for the host's "Password:" prompt. At this point, you would type your password at the keyboard. It sends the password and a CR, and waits for the DCL "$" prompt. Then the softkey runs an application program; this example runs the EDT editor.

This softkey definition would be suitable to run immediately after running the previous example. You could link them together it by adding a <Jump><Alt 1> instruction at the end of the example in figure 11.3.

```
                         Softkey Definition
  Key:  <Alt 1>                              edit        insert       >more
<NL>
<UCom> *** SOFTKEY TO LOG IN AND START A VMS APPLICATION *** <NL>
<NL>
<UCom> *** SEND A RETURN TO GET VMS'S ATTENTION <NL>
<Return> <NL>
<NL>
<UCom> *** WAIT FOR VMS NAME PROMPT <NL>
<Match, t/o 20> Username: <Match end> <Fail goto 10> <NL>
<NL>
<UCom> *** PAUSE TO ENSURE THAT VAX IS READY TO RECEIVE <NL>
<Wait  1> <NL>
<NL>
<UCom> *** ENTER YOUR VMS ACCOUNT NAME <NL>
HTEST <Return> <NL>
<NL>
<UCom> *** WAIT FOR VMS PASSWORD PROMPT <NL>
<Match, t/o 20> Password: <Match end> <Fail goto 10> <NL>
<NL>
<UCom> *** ENTER PASSWORD FROM KEYBOARD <NL>
<Keyboard> <Return> <NL>
<NL>
<UCom> *** AFTER PASSWORD, WAIT 60 SECONDS FOR VMS DCL PROMPT <NL>
<Match, t/o 60> $ <Match end> <Fail goto 10> <NL>
<NL>
<UCom> *** NOW EXECUTE YOUR FAVORITE APPLICATION <NL>
edt <Return> <NL>
<NL>
<UCom> *** EXIT SOFTKEY <NL>
<Exit> <NL>
<NL>
<UCom> *** LOGIN FAILED, SEND MESSAGE TO SCREEN <NL>
<Label 10> <NL>
<Remark> login failed, try again!! <NL>
```

Figure 11.4. Softkey Example to log in and start an application

Chapter

12

Phone Directory

Phone

Phone

Introduction

The PHONE command is a quick and easy method of storing and dialing frequently used modem numbers. It allows you to define the modem command sequence that will precede all of the numbers you dial, create a personal directory of telephone numbers and special commands, and physically place a call through your modem.

You are not restricted to using the PHONE command to control your modem. You can always use ZSTEM to maintain a direct dialogue. The PHONE command, however, similar to the speed dial function on telephones, can result in considerable time savings.

To call a number in your PHONE directory, you must have an internal or external modem that supports autodial commands and an ASCII command language. Although the examples given in this chapter are for modems using the Hayes "AT" command language, the PHONE command is not limited to this command language.

The PHONE command uses softkeys which are described in detail in Chapter 11. You should be able to set up and use a simple PHONE directory, however, using only the examples provided in this chapter.

Phone

Storing Your Autodial Command

The PHONE command's Setup function lets you store the character string which instructs your particular modem to autodial a number. This string is called the Phone Setup softkey; the characters in it are sent to your modem in all PHONE requests.

To store the autodial command, press ALT+Z, type at the "ZSTEM?" prompt: **PHONE /S** and press RETURN

ZSTEM will then display a Softkey Definition screen, inviting you to define the dialing sequence for the Phone Setup softkey. You define the Phone Setup softkey in the same manner as other softkeys. Simply enter the character string you want to send to your modem in all subsequent PHONE requests. Use the <Phone number> softkey instruction, ALT+P, to indicate the position in which your phone number will be placed. If you make a mistake, correct it with BACKSPACE, or press CTRL+BREAK to quit and restore the previous definition. To finish the definition, press ALT+T. For more details on softkey programming, refer to Chapter 11.

If you have a Hayes-compatible modem, you could program the Phone Setup softkey using the following example.

> **`ZSTEM? phone /s`** RETURN
> A, T, D, T, ALT+P, RETURN, ALT+T

As you press these keys, your screen will appear as in Figure 12.1.

When you later make a PHONE request, ZSTEM sends your modem the characters ATDT, the "chosen" phone number, and CR. (ATDT tells a Hayes modem to tone-dial the following number.)

The following section tells you how to define and store phone numbers for later use in a PHONE request.

If you want to change the modem commands in your Phone Setup softkey, select /S again at the PHONE command prompt. The existing Phone Setup softkey will be

shown. You can edit it using standard softkey editing techniques described in Chapter 11.

```
                              Softkey Definition
   Key:  <Phone Setup>                              edit          insert
AIDI <Phone number> <Return>
```

Figure 12.1. Example of a Phone Setup softkey definition

Phone

Adding to Your Personal Telephone Directory

The PHONE command's Directory function lets you insert telephone numbers into your personal telephone directory or edit entries already in that directory. The directory is actually the Phone Dir softkey. You can use the entries in this directory in subsequent PHONE requests.

To change or add to the contents of your directory, press ALT+Z, type at the "ZSTEM?" prompt: **PHONE /D** and press RETURN

ZSTEM will then display a Softkey Definition screen including any entries you have previously stored in your personal telephone directory.

You define the Phone Dir softkey in the same manner as other softkeys. You cannot, however, use softkey logical instructions. Finish your definition with ALT+T. If you make a mistake, you can correct it with BACKSPACE, or press CTRL+BREAK to quit and restore the previous definition. As you accumulate more entries in your directory, you will probably want to use softkey editing features. For more detail, refer to Chapter 11.

Each entry in the directory has the following format:

```
name=number <NL>
```

name — The entry name in the directory. Must be 16 characters or less, and contain no blanks.

number — The phone number to be sent to the modem. Must be 32 characters or less.

<NL> — Each entry ends with the <NL> instruction, which you obtain by pressing ALT+B.

Entries can also contain optional fields as follows:

```
name(comment)=<Jump><key> number <NL>
```

(*comment*) An optional comment enclosed in parentheses. Comment can be of any length.

<Jump><*key*> An optional softkey instruction which executes the softkey program assigned to the named key. Press ALT+J to include the <Jump> instruction. This softkey will be executed before the Phone Setup softkey. You could use it to make specific configuration changes before dialing a particular number. The <Jump> instruction is described in Chapter 11.

To obtain a printed copy of your directory, use the TYPE command described in Chapter 11, which lists the contents of the Phone Dir softkey as well as the contents of your regular softkeys. Or you could request a print-screen as described in Chapter 8.

An example directory, as it might appear on your screen, is shown in figure 12.2.

```
                              Softkey Definition
  Key:  <Phone Dir>                                  edit        insert
GEORGE=879-5555 <NL>
ANNE(OFFICE)= <Jump> <F6> 995-2121 <NL>
```

Figure 12.2. Example of a Phone Dir softkey definition

Using Your Phone Directory

Invoking the PHONE Command

The PHONE command can be used to dial any number from your personal telephone directory, or any number you specify. The autodial control sequence sent to your modem before the number will be the sequence you previously stored using the PHONE setup function.

```
ZSTEM? phone
Select /Setup, /Directory, or request?
```

Enter a name from your telephone directory, or hashmark (#) followed by a number.

For example, assuming your Phone Setup softkey and telephone directory are as shown in the previous example, you could now call George by typing:

```
Select /Setup, /Directory, or request? george
```

ZSTEM would send the sequence ATDT879-5555 <CR> to your modem.

You could call Anne by typing:

```
Select /Setup, /Directory, or request? anne
```

ZSTEM would execute the softkey program assigned to F6, then send the sequence ATDT995-2121 <CR> to your modem.

Rather than calling a number from your telephone directory, you could call an arbitrary number. For example, you could type:

```
Select /Setup, /Directory, or request? # 879-1111
```

ZSTEM would send the sequence ATDT879-1111 <CR> to your modem.

As with all ZSTEM commands, you can invoke the PHONE command with its parameters on the same line. For example:

```
ZSTEM? ph george
```

When ZSTEM searches your PHONE directory, it does not distinguish between upper-case and lower-case letters. It looks for the first entry which matches the name you give in the PHONE request. If you give only the first few characters of the name, ZSTEM will select the first entry that starts with those characters. If the search succeeds, the selected phone number becomes the "chosen" phone number, and the setup sequence is sent to the modem. If the search fails, an error message is displayed.

The PHONE command is different from most ZSTEM commands in that after you have given a PHONE request, ZSTEM immediately returns to terminal mode. In contrast, after you have given other commands, ZSTEM remains in command mode until you press RETURN.

The PHONE Command and Softkeys

Phone

The PHONE command can be included in a softkey program in the same way as any other ZSTEM command. For example, you could write a softkey program that contained the following text and assign it to F8:

```
<Cmnd Mode> phone george <Return>
```

Provided that you have stored the correct autodial sequence in the Phone Setup softkey, and that GEORGE exists in your Phone Dir softkey, if you now press F8, your modem will autodial George's number and ZSTEM will revert to terminal mode ready for you to respond when "George" answers.

In addition, any softkey program can retrieve the last phone number that was looked up in a PHONE request. The softkey instruction <Phone number>, which you can produce by typing ALT+P in a softkey programming session, inserts into the text the last phone number that was looked up in a PHONE request.

Chapter

13

Operating System Environment

Environment

Introduction

This chapter discusses ZSTEM's interaction with its surrounding environment: how it behaves with terminate-and-stay-resident programs (TSRs), how to temporarily leave ZSTEM to run a program, about special keyboard handling and memory requirement, and how to run ZSTEM under the Windows operating system.

ZSTEM normally takes direct control of your computer's serial and parallel ports. By default, it will also directly control your keyboard and printer. This significantly improves overall performance, but may cause some interference with terminate and stay resident (TSR) programs. In addition, if you want to temporarily exit to the operating system and run another program, you must ensure that ZSTEM returns the ports to their expected state.

This chapter describes the special commands and menu items that affect how ZSTEM interacts with other programs.

Leaving ZSTEM

EXIT Command

When you terminate ZSTEM, you may wish to remain connected to your host. If the item **Restore port** on the Session Configuration screen is set to **Never**, the Data Terminal Ready (DTR) line on your COM port (pin 20) remains in a TRUE state. The serial ports will not be initialized. The interrupt vector will be restored and interrupts will be disabled. This allows most modems to remain connected.

Environment

If **Restore port** is set to **Exit** or **Exit+DOS call**, the status of the port will be restored to its status prior to invoking ZSTEM. This will normally cause a hangup. See the section "Ending a Session" in Chapter 4 for more details on the HANGUP command.

If you exit ZSTEM while a file is open for a DISK write, the file will be automatically closed.

To exit from ZSTEM:

- Press ALT+Z to go into command mode. ZSTEM responds with:

  `ZSTEM?`

- Type **EXIT** and press RETURN. You can shorten this to **E**. ZSTEM terminates and the system prompt is displayed.

RUN and SHELL Commands

ZSTEM allows you to access system commands from within the emulator. The RUN command lets you run a single utility or application. The SHELL command temporarily exits you to a modified system prompt, where you can run system commands or applications. You must give an EXIT command to return to ZSTEM. The item **Restore port** on the Session Configuration screen determines how ZSTEM handles the port when you give the RUN or SHELL command.

RUN

To run a system command or program from ZSTEM:

- At the "ZSTEM?" prompt, type **RUN** *command* and press RETURN where *command* is a legitimate command or program name. You can shorten this to **R** *command*.

On completion of the command, the "ZSTEM?" prompt is displayed. When you press RETURN, the previous emulation screen is restored.

SHELL

To enter a system shell from within ZSTEM:

- At the "ZSTEM?" prompt, type **SHELL** and press RETURN. You can shorten this to **SH**.
- A modified system prompt will be displayed. For example, if your default is drive C:, the following will be displayed:

  ```
  [ZSTEM] C>
  ```

  You can enter any number of commands. You must ensure that you have enough memory for both ZSTEM and the programs. Refer to the section "Overlays and Memory" in this chapter for more details.
- To return to ZSTEM, at the modified system prompt type: **EXIT** and press RETURN.
- The "ZSTEM?" prompt is then displayed. Press RETURN to restore the screen contents which existed before you entered command mode.

DOS COMMAND.COM File

In order to use the RUN or SHELL commands, you must have the COMMAND.COM file available on your path. You can also use the environment variable COMSPEC to point to your COMMAND.COM file. Refer to the SET command in your DOS manual for more details.

If there is a disk error, or you have changed the location of your COMMAND.COM file, you may get the DOS error:

```
DISK ERROR Abort, Retry, Ignore
```

It may be possible to replace your system disk and choose "Retry." The result of choosing "Ignore" is unpredictable. If "Retry" results in the same error message, choose "Abort." If ZSTEM is re-entered successfully, there should be no problem. However, if the system returns to the DOS prompt, you should reboot your system.

Effect on the Display

ZSTEM normally runs your graphics adapter in a graphics mode. Many applications, however, expect your graphics adapter to be in its text mode. When you give the ZSTEM RUN or SHELL command to run commands or applications, you need to ensure that your adapter is running in the proper mode. If your adapter is not in the proper mode, the screen will become confused. ZSTEM always returns your adapter to its graphics mode when it returns to emulation.

The value of the item **Reset screen on DOS call** on the Display Configuration screen determines whether or not ZSTEM will clear the screen and put your adapter in text mode when it runs a system command.

Y The screen is cleared, changed to text mode and a cursor is displayed. This is the default.

N The adapter remains in graphics mode during DOS calls. The screen is not cleared. DOS does not display a cursor in graphics mode.

Effect on Serial Ports

The item **Restore port** on the Session Configuration screen is also important when you temporarily exit with the RUN or SHELL command.

If this item is set to **Exit+DOS call**, each time you give the RUN or SHELL command, the interrupt vector and status will be restored to the values they had before entering ZSTEM. When you return to ZSTEM, the ports will be initialized. This option should be selected if any of the programs you want to run reconfigure and use the port.

If this item is set to **Never** or **Exit**, the serial port will not be changed on leaving or returning to ZSTEM. This will leave ZSTEM in control of the serial port during the system call. Incoming characters will continue to be buffered within ZSTEM. Once the buffer is full, ZSTEM will send an Xoff out the remote port. Upon returning to ZSTEM, the buffered characters will be processed.

Leaving Because of Error

If the item **Terminate on error** on the General Configuration screen is set to **N**, when ZSTEM encounters an error in command mode, it will abort the current function, display an error message, sound the bell and return to the command mode prompt. **N** is the default value.

If this item is set to **Y**, the error will cause an immediate termination of ZSTEM with a DOS error return code. NOTE: Invalid entries to the CONFIGURE command are considered to be "errors". You may therefore wish to leave this item set to **N**.

The !ERROR command allows you to set the error code to any arbitrary value. See the "Error" section in the "Programmer's Reference" chapter for more details.

Effect on Serial Ports

When ZSTEM exits because of an error condition, the ports will NOT be restored, regardless of the item **Restore port** on the Session Configuration screens.

Special Keyboard Handling

ZSTEM normally handles keyboard input directly, bypassing any DOS processing or BIOS keyboard handling. Many terminate-and-stay-resident programs (TSRs) attempt to use the keyboard. ZSTEM's normal keyboard handling may interfere with these TSRs. To avoid this, ZSTEM provides two additional methods of special keyboard handling.

ZKB.COM

ZSTEM normally uses its own internal keyboard handler. Although this provides speed and flexibility for ZSTEM, it may interfere with other memory resident programs. For this reason, ZSTEM provides an alternate method of keyboard handling: its own RAM resident program, ZKB.COM.

This method provides exactly the same ZSTEM functions as the default internal method, but reduces the chance of interference with other programs. To use this method, you should do the following before running ZSTEM:

- Run ZKB.COM, itself a RAM-resident program supplied on your ZSTEM distribution disk.
- Run any other RAM-resident programs. They should not be affected by ZKB.COM.

Now, when you run ZSTEM, it will detect ZKB and use it, instead of the default internal method.

BIOS Keyboard

ZSTEM also allows you to use normal PC BIOS keyboard handling. This is useful when running ZSTEM in Windows and similar environments. This method may be useful when the two previous methods of keyboard handling interfere with RAM-resident programs. Unfortunately, even this method cannot avoid problems with particularly ill-behaved RAM-resident programs.

If your PC has an enhanced keyboard BIOS, and you have an Enhanced or PowerStation keyboard, BIOS handling yields almost the same keyboard layout as the internal ZSTEM handling. The few differences are described in Table 13.1. In addition, if you use BIOS handling, the PowerStation keyboard is not automatically switched between DOS mode and the special VT mode. You can switch it manually, or not at all. The only apparent difference between DOS mode and VT mode is the behavior of ESC on the top row, and the color of the indicator LEDs.

If your PC does not have an enhanced keyboard BIOS, or your keyboard is not Enhanced or PowerStation, the basic BIOS handling assumes an XT or AT keyboard. Most of the "enhanced" keys do not work. The differences are significant; some are described in Table 13.1.

To use the BIOS keyboard handling, merely include the B command line switch when you run ZSTEM:

```
C:\> zstem320 /b
```

If you save this configuration, you will not need to include the B switch when you run ZSTEM again.

The Z command line switch returns a ZSTEM configuration saved with the B switch to the normal method of internal keyboard handling.

Table 13.1 describes the differences between ZSTEM's own keyboard handling (internal and ZKB.COM), enhanced BIOS, and basic BIOS keyboard handling.

Alt Key

With all methods of keyboard handling, ALT is not valid when pressed alone. ALT is always used in combination with other keys, similar to SHIFT and CTRL. (On a PowerStation keyboard, ALT is valid alone: the left ALT key is COMPOSE, the right ALT is SETUP.)

ALT can also be used to generate any arbitrary character code (from 0 to 255) on the keyboard. To do this, hold down ALT while you type the decimal value of the desired character on the numeric keypad. When you release ALT, the keyboard will transmit the code you entered, just as if you had pressed that character.

NumLock Key

On Enhanced, PowerStation, and LK250 keyboards, the keypad is forced into the numeric state when ZSTEM starts.

ZSTEM does not normally force the keypad on XT and AT keyboards into numeric state; NumLock is left in its current state. You must ensure that the keyboard is in numeric state for VT emulation.

If your PC has no NumLock light (e.g. IBM XT), or a NumLock light that is software controlled (e.g. IBM AT), you can force the keypad into numeric state when ZSTEM starts, by including the N command line switch. However, do not use the N switch if your PC has a NumLock light that cannot be controlled by software (e.g. Zenith XT); the NumLock light could get out of step with the actual NumLock state. The effect of the N switch can be removed by the U command line switch.

If the NumLock light does get out of step with the actual NumLock state, and you are not using BIOS keyboard handling, you may be able to correct this by pressing CTRL+NUMLOCK.

TABLE 13.1
Differences Between ZSTEM and BIOS Keyboard Handling

VT Function	Internal or ZKB.COM	Enhanced BIOS with Enhanced KB or PowerStation	Basic BIOS
Print text screen	PRINT SCREEN or SHIFT+PRTSC	PRINT SCREEN	SHIFT+F4
Toggle autoprint	CTRL+PRINT SCREEN or CTRL+PRTSC	Enh: CTRL+PRINT SCREEN PStn: not available	not available
Shift F13 .. F20	Enh: CTRL+SHIFT+F3 .. F10 PStn: SHIFT+F13 .. F20	Enh: ALT+F3 .. F10 PStn: CTRL+SHIFT+F3 .. F10	ALT+F1 .. F10
Esc key	Enh: ESC PStn: top-row ESC	Enh: ESC PStn, VT mode: top-row ESC PStn, DOS mode: CTRL+[	ESC
Keypad MINUS	Enh: SHIFT+PLUS PStn: keypad MINUS	Enh: CTRL+PLUS PStn: keypad MINUS	not available
DEL	BACKSPACE	BACKSPACE or SHIFT+BACKSPACE	BACKSPACE or SHIFT+BACKSPACE
BS	SHIFT+BACKSPACE or CTRL+BACKSPACE	CTRL+BACKSPACE	CTRL+BACKSPACE
Caps lock	Effect of SHIFT and CAPSLOCK depends on item on Keyboard Configuration screen	SHIFT always reverses CAPSLOCK	SHIFT always reverses CAPSLOCK

Environment

HOTKEY

The HOTKEY command prepares your keyboard and display prior to running Hotkey or TSR programs. It resets the screen and keyboard environment for hotkey access and clears the screen.

To invoke a TSR:

- At the "ZSTEM?" prompt, type **HOTKEY** and press RETURN. You can shorten this to **HO**.
- The next keystroke will go directly to the resident TSR.
- When the TSR function is complete, the next keystroke will cause ZSTEM to restore its environment and the previous emulation screen.

Overlays and Memory

ZSTEM will run in as little as 220Kbytes of memory but will use more if it is available. ZSTEM achieves this through the use of dynamic overlays. With dynamic overlays, only the required portions of ZSTEM are kept in memory. All overlays are held in ZSTEM's EXE file. For this reason, that file must always be available when ZSTEM is running.

The following sections describe how you can customize the amount of memory that ZSTEM requires. You may want to do this if you have only a small amount of available memory, or if you are running from a floppy diskette system or a slow network drive.

Running From Floppy Diskette

You may notice some performance degradation if you are running ZSTEM from floppy diskette or a slow network drive. This is because ZSTEM must read from the drive each time it accesses a new overlay. You can, however, force ZSTEM to load all overlays into memory. This requires more memory to be available, but will avoid ZSTEM reading the floppy each time it wants to access an overlay.

To force all overlays to be loaded into memory at initialization time, use the command line switch A. This switch is not saved in the configuration, so you must include it on the command line each time you want its effect. At the operating system prompt, type **ZSTEM320 /A**

Displaying Available Memory

ZSTEM requires a minimum system memory configuration of 360Kbytes. ZSTEM itself takes about 220K. Total memory requirements may vary if you are using memory resident programs, or if you want to invoke other programs from within ZSTEM. You can use the MEMORY command to tell you the amount of memory used by various ZSTEM buffers and the amount of memory available for other programs.

To display memory statistics:

- At the "ZSTEM?" prompt, type **MEMORY** and press RETURN. You can shorten this to **MEM**.
- The following will appear on the 25th line:

```
RAM Stats: Disk= a1/a2, Softkey= s1/s2, DOScall= d
```

Where:

a1	Is the number of bytes of disk buffer memory in use from a DISK WRITE.
a2	Is the total number of bytes available for the DISK WRITE buffer.
s1	Is the number of bytes of softkey buffer memory used.
s2	Is the total number of bytes of softkey buffer available.
d	Is the total number of bytes available for DOS calls. This does not account for COMMAND.COM which is automatically loaded when ZSTEM runs a DOS program (approximately 30Kb).

Note: Use of this command within a softkey or in command type-ahead causes termination of the softkey or type-ahead.

Minimizing Memory Requirements

By changing the following ZSTEM parameters, you can affect ZSTEM's overall memory requirements.

Window back buffer

ZSTEM maintains a buffer containing the most recent lines which have scrolled off the top of the screen. These lines can be viewed with the WINDOW command. By default, this buffer is allocated to the minimum possible size. It can, however, be increased to store more lines, with the item **Window back buffer request** on the

Display Configuration screen. Leave this item at its default setting of **Min** to minimize memory use.

Printers

If you are not going to use a printer, set the item **Type** on the Text Printer Configuration screen to **None**.

Display Type and Resolution

ZSTEM uses memory for display adapter fonts. You can reduce the amount of display memory ZSTEM requires by using your display adapter in the lowest acceptable resolution. For example, you could use your VGA at EGA resolution by using the startup switch:

```
> zstem320 /d:EGA-like
```

In addition, for EGA or VGA type displays, you should set Screen resolution to **Normal** and **Maintain aspect ratio** to **Y**.

Disk Write

ZSTEM must allocate a 16K buffer when it executes a DISK WRITE command. If you do not have 16K available, do not use this command.

Kermit Menu option

If memory is particularly restricted, you should access the Kermit Configuration screen from the "ZSTEM?" prompt, instead of the Kermit prompt.

Sessions

ZSTEM supports up to 4 concurrent sessions. Each session requires a given amount of memory. You should therefore only configure as many sessions as you are planning to use.

ZSTEM Under Windows 3

This section describes how ZSTEM 320 functions in the Windows version 3.x environment. Windows version 3.x has three modes: Real, Standard, and 386 enhanced. The distribution disk contains three PIFs. Each assumes that the complete filename of your ZSTEM program is C:\ZSTEM\ZSTEM320.EXE. Refer to "Copying Individual Files from the Distribution Disk" in Chapter 2 to decompress the file WINDOWS3.ZIP. The PIF filenames are:

ZSTEM320.PIF
: For running ZSTEM in the full screen, either Real/Standard or 386 Enhanced Mode.

Z320TEXT.PIF
: For running ZSTEM in a window, 386 Enhanced Mode. This uses a text display driver.

Z320GWIN.PIF
: For running ZSTEM in a window, 386 Enhanced Mode. This uses a graphics display driver.

Real and Standard mode

The following paragraphs describe ZSTEM 320 in the Real or Standard modes of Windows 3. In most cases, the supplied PIF files contain the parameters described. If a choice exists, the default in the supplied PIF file is indicated.

In Real or Standard mode, you can run ZSTEM in the full screen. You cannot run it in a window. Setting of "Video Mode" must be "Graphics/Multiple Text." The value for "Memory Requirements" is 240KB up to 300KB. ZSTEM requires no XMS memory.

So that ZSTEM does its own print screen (rather than putting screen snapshots into the clipboard), the PIF files reserve the shortcut keys PRTSC and ALT+PRTSC for ZSTEM.

Windows works best if you use BIOS keyboard support (/B switch). Table 13.1 shows some of the differences in keyboard operation. The PIF file is shown with "/B" selected in the "Optional Parameters" field.

If you want to be able to switch back to Windows 3 without exiting from ZSTEM, you must do the following four things. The PIF files are already set up this way, so that you can switch back to Windows 3 without exiting from ZSTEM.

1. In the PIF file, tell ZSTEM to use BIOS keyboard support (Optional Parameter /B).

2. Don't use a special video mode; if you do, everything appears to be OK until you switch to Windows 3 and back to ZSTEM. To avoid special video modes, on the Display Configuration screen, item **Screen Resolution**, select **Normal**.

3. In the PIF file, don't indicate that ZSTEM "Directly Modifies" any COM port. While you are switched back to Windows, ZSTEM will not receive any data which arrives. Also, Windows won't prevent any other program from trying to use the same COM port.

4. Don't reserve the ALT+TAB, ALT+ESC, or CTRL+ESC shortcut keys for ZSTEM. You need to be able to use them to switch from ZSTEM back to Windows.

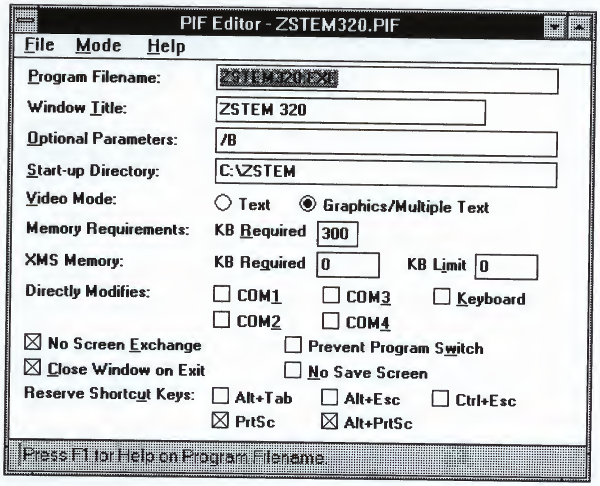


Figure 13.1. Example PIF for use in Real and Standard mode

386 Enhanced mode

The following paragraphs describe ZSTEM 320 in the 386 Enhanced mode of Windows 3. In most cases, the example PIF file contains the parameters described. If a choice exists, the default in the PIF file is indicated.

In 386 Enhanced mode, you can run ZSTEM in the full screen or in a window. The PIF file indicates "Full Screen."

When you run ZSTEM 320 in the full screen:

- You cannot select the background execution option; this means that ZSTEM will be suspended when you switch away from it.

When you run ZSTEM 320 in a window:

- If you do not require graphics, in the PIF "Optional Parameters" include /D:Text. This configures **Display Adapter** on ZSTEM's Display Configuration screen to **Text**.

- If you require graphics, in the PIF "Optional Parameters" include /D:CGA-like. This configures **Display Adapter** to **CGA-like**; consequently, only one color will be available. Performance is slower than full screen. In the PIF "Optional Parameters" include /S (software scroll).

In "Memory Requirements", use at least 240KB. You will obtain better performance with 300KB.

So that ZSTEM does its own print screen (rather than putting screen snapshots into the clipboard), the example PIF files reserve the shortcut keys PRTSC and ALT+PRTSC for ZSTEM.

You can use ZSTEM's own keyboard handling, or use BIOS keyboard handling (/B switch). Table 13.1 shows some of the differences in keyboard operation. The PIF file does not specify /B. If you want to be able to paste data into ZSTEM, tell ZSTEM to use BIOS keyboard support; if you don't, an attempt to paste will lock the ZSTEM window in a paste state. The example PIF files has no optional parameters selected; select "/B" if you want to be able to paste data into ZSTEM. Also, you can lose some paste data if you check "Allow Fast Paste."

The PowerStation keyboard does not automatically switch into ZSTEM mode (Windows prevents ZSTEM from doing this), so if you want to change your keyboard mode, you must press CTRL+HOLD SCREEN.

When running in 386 Enhanced mode, Windows (not ZSTEM) controls the serial port and receives the serial data, buffers it, and passes it to ZSTEM. Since Windows multi-tasks the various applications, ZSTEM may not always be active to receive the

data. The Windows default buffer size is 128 characters. At high speeds, 128 characters can arrive very quickly. (approx 130 msec at 9600 bps) and it is possible that the buffer will overflow before Windows activates ZSTEM to receive the data. To help prevent this overflow, you can increase the size of the buffer to 1K or more. For COM1, put the following line into the [386Enh] section of your SYSTEM.INI file:

```
COM1Buffer=1024
```

Windows has a parameter that defines the maximum time an application has to process a communication interrupt. The default is 2 milliseconds. You should increase this to about 10 msec. Put the following line into the [386Enh] section of your SYSTEM.INI file:

```
ComBoostTime=10
```

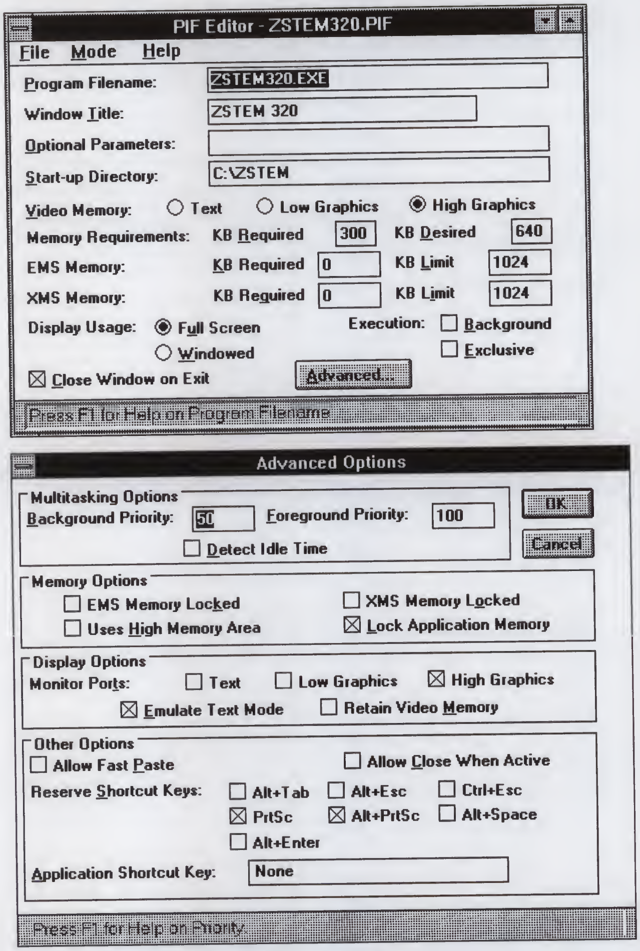


Figure 13.2. Example PIF for use in 386 Enhanced mode, full screen

Environment

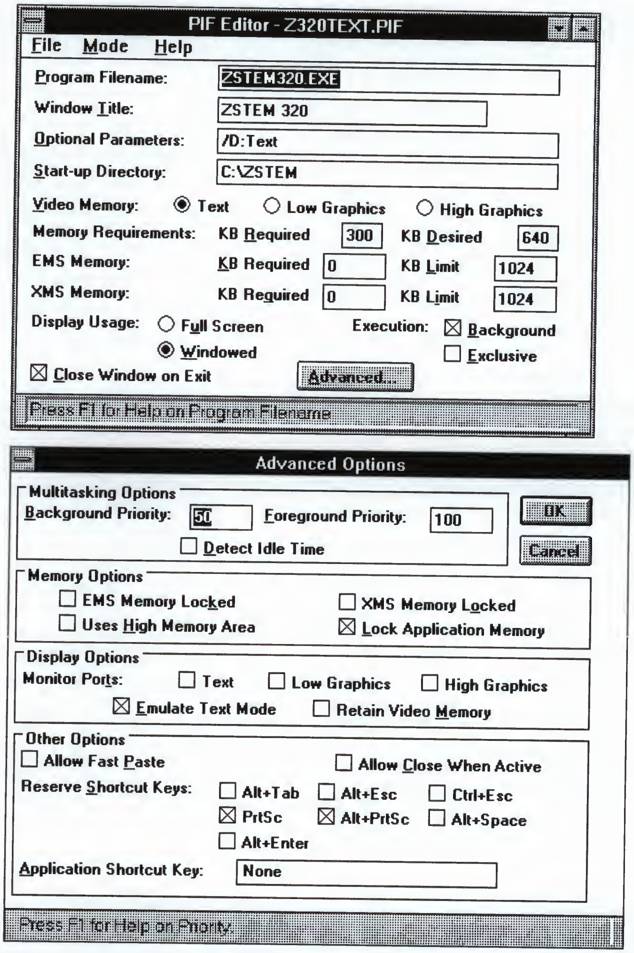


Figure 13.3. Example PIF for use in 386 Enhanced mode, in a window (text)

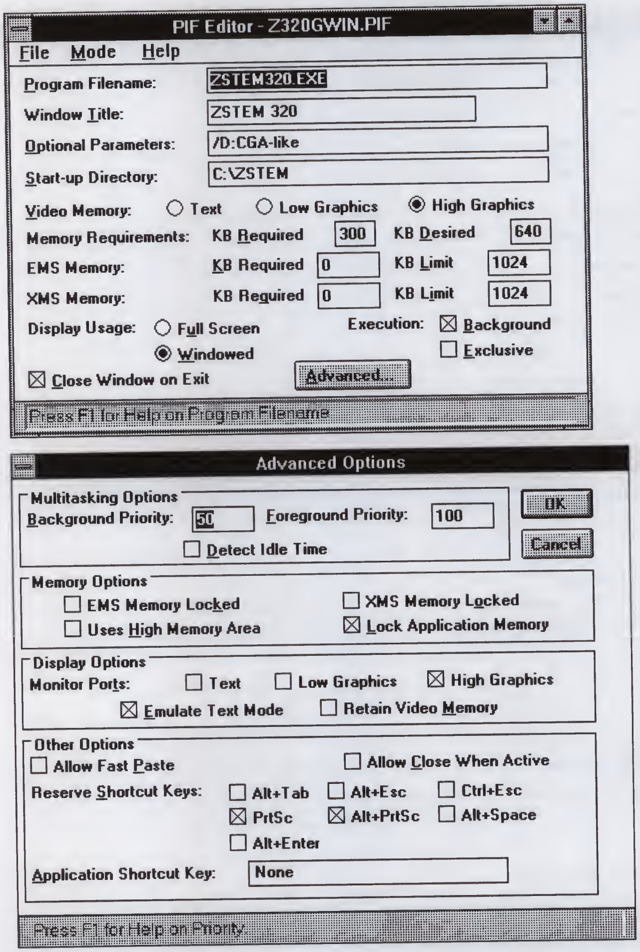


Figure 13.4. Example PIF for use in 386 Enhanced mode, in a window (graphics)

Using LAT with ZSTEM 320 under Windows

A utility program LATDAT.COM is included with ZSTEM. LATDAT is a TSR module containing a LAT data area which Windows will not relocate. This permits LAT connections to be maintained when ZSTEM has exited. It also allows multiple copies of ZSTEM 320 to use LAT. Chapter 4 contains information about using PATHWORKS under Windows.

You could type the following steps, or include some in your AUTOEXEC.BAT file.

- Start your normal LAT network software. It must be compatible with Windows version 3.
- Run LATDAT as follows:

  ```
  LATDAT /n
  ```

  where n is the maximum number of simultaneous LAT sessions that can be connected, 1 through 4. If /n is omitted, the default is 2.
- Run Windows. Check with the vendor of your LAT software to find out any restrictions on operation with Windows. In particular, find out if you can run Windows in 386 Enhanced mode, or only in standard mode.
- Run ZSTEM 320. Because you are using standard mode, you must run ZSTEM in the full screen. You can run multiple copies of ZSTEM, using ALT+TAB to switch between them. If you set the item **Restore port** to **Never** on ZSTEM's one or more Session Configuration screens, you can exit and restart ZSTEM with your LAT session(s) still connected.

Other Networks

Networks which use an INT14 or similar interface (PCS1, Net1, RAF) and networks which use NetBIOS all work under Windows, provided that the network interface supports Windows 3.x.

Telnet networks will work under Windows only if the network interface supports Windows 3.x.

ZSTEM Under DESQview

ZSTEM can operate in text or graphics mode in a DESQview window or as a full screen application with DESQview version 2.4.0 or later. The distribution disk contains two DESQview PIF (.DVP) files. Refer to "Copying Individual Files from the Distribution Disk" in Chapter 2 to decompress the file DESQVIEW.ZIP. The PIF filenames are:

ZT-PIF.DVP - text mode operation in a window or full screen

ZG-PIF.DVP - graphics mode operation in a window or full screen

It is not recommended to run multiple copies of ZSTEM at the same time. DESQview appears to allow more than one ZSTEM to start on the same port, even though the .DVP file indicates that ZSTEM wants exclusive use of the port. Problems with colors also occur when running multiple copies of ZSTEM.

ZSTEM normally uses its own colors ehich are typically different from standard PC colors. When you use ZSTEM in a window, you will notice that ZSTEM's colors are "correct" only when ZSTEM is the foreground task, and some other program's colors are corrrect only when that program is the foreground task. This is the expected behaviour; it does not indicate a problem. Please consult your DESQview manual for further information on colors.

To install ZSTEM under DESQview, first install ZSTEM under DOS. Then start and configure ZSTEM for DESQview as follows:

- BIOS keyboard support (/B on command line)
- Software scrolling (/S on command line or set item **Software scroll** on the Display Configuration screen to **Yes**)
- Resolution (set item **Screen resolution** on the Display Configuration screen to **Normal**)
- Colors (set item **VGA Colors** on the Color Configuration screen to **64 colors**)

Save this configuration as your default configuration ZSTEM320.CFG. (If you want to save to a different filename, modify the .DVP file to load your configuration file, i.e. add **/c:***filename***.cfg** to the command line parameter.)

Copy the .DVP files into your DESQview directory, usually C:\DV.

Start DESQview, and add ZSTEM to your task list, as follows:

> Open File, Add Program, Other, enter the pathname where you copied the ZSTEM DVP files, select the .DVP file you want (or both), press RETURN when you are done.

If you need to change the PIF files, use the Change Program function.

Chapter

14

Programmer Reference

Reference

Reference

Introduction

This chapter covers a variety of advanced topics for ZSTEM users. It describes how to program the DOS error code for ZSTEM debugging; how to answer the host when it sends an enquiry (ENQ) or a Primary or Secondary Device Attribute request; how to use ZSTEM's local help facility to custom program local help screens; and how to use ZSTEM as a data line monitor.

Reference

Errors

An error code is returned to DOS whenever a program exits. ZSTEM returns a 0 when it terminates normally, and the ZSTEM error code when it terminates abnormally. You can use ZSTEM's !ERROR command to set the error code to an arbitrary value.

The default value of the item **Terminate on error**, on the General Configuration screen is **N**. With this value, if ZSTEM encounters an error in command mode, it will abort the current function, display an error message, sound the bell and return to the command mode prompt. If Terminate on error is set to Y, ZSTEM will exit when it encounters an error, and will return the default error code, or the error code set by the last !ERROR command. (As invalid entries to the CONFIGURE command are considered "errors", you may want to leave this item set to **N**.)

A batch program can invoke ZSTEM and test the outcome of subsequent ZSTEM operations. The !ERROR command can be used to determine where a fatal error occurs in a softkey. For example, you could progressively increment the value of the error code in a softkey. If softkey execution terminates because of an error, the error code will identify the position in the softkey where the error occurs. You should always set the error code back to zero at the end of a softkey.

To set your own error code:

- At the "ZSTEM?" prompt, type **!ERROR** and press RETURN.
- The following will be displayed:

  ```
  Error Code?
  ```

  Type an error code between 0 and 255 followed by RETURN. You should use a code value above 100 so that it is not confused with an internally-generated code.

You can restore the default error codes by using the !ERROR command to set the error code to 0.

Reports

The items **Terminal mode**, **VT100 terminal id**, and **VT300 terminal id** on the General Configuration screen determine the response that ZSTEM will send to the host when it receives a Primary or Secondary Device Attribute request. In addition, ZSTEM allows you to customize your response to these requests with the PRIMARY and SECONDARY commands.

The ANSWERBACK command lets you set the answerback character sequence that will be sent in response to an enquiry request (Ctrl-E) from the host.

ZSTEM also implements the complete set of VT300 terminal and presentation state reports and restores.

Primary Device Attributes

The Primary Device Attribute request has the form **CSI 0 c** or **CSI c**. If your system is configured for 7-bit communication, the host will send ESC [in place of CSI.

ZSTEM will respond with the sequence which you have stored using the PRIMARY command. If you have not stored anything using this command, ZSTEM will respond with the standard reports shown in table 14.1. The report depends on the value of the items **Terminal mode**, **VT100 terminal id**, and **VT300 terminal id** on the General Configuration screen.

To override all the standard Primary Device Attribute reports and define your own report:

- At the "ZSTEM?" prompt, type **PRIMARY** and press RETURN. You can shorten this to **PRI**.
- The following will be displayed:

```
Key: <Primary Attributes>
```

Reference

Enter the desired character sequence for the new Primary Device Attribute report. Entry is the same as for regular softkey definitions. Refer to the section "Editing Your Softkey Definition" in Chapter 11. To terminate entry and editing press ALT+T.

Note: An incorrect device attribute response may cause a host to fail to recognize your "terminal".

TABLE 14.1
Standard Primary Device Attribute Reports

Terminal mode	VT300 terminal id	Standard Primary DA report
VT300/7-bit	VT320	ESC [?63;1;2;6;7;8;9;15c
VT300/7-bit	VT220	ESC [?62;1;2;6;7;8;9c
VT300/8-bit	VT320	CSI ?63;1;2;6;7;8;9;15c
VT300/8-bit	VT220	CSI ?62;1;2;6;7;8;9c

Terminal mode	VT100 terminal id	Standard Primary DA report
VT100	VT320	ESC [?63;1;2;6;7;8;9;15c
VT100	VT220	ESC [?62;1;2;6;7;8;9c
VT100	VT100 *	ESC [?1;2c
VT100	VT101	ESC [?1;0c
VT100	VT102	ESC [?6c

63 operating level 3
1 132 columns
2 printer port
6 selective erase
7 DRCS
8 UDK
9 7-bit National Replacement Character sets
15 Technical Character set

* VT100 with Advanced Video Option.

Reference

Secondary Device Attributes

The Secondary Device Attribute request has the form CSI > 0 c or CSI > c. If your system is configured for 7-bit communication, the host will send ESC [in place of CSI.

ZSTEM will respond with the sequence which you have stored using the SECONDARY command. If you have not stored anything using this command, ZSTEM will respond with the standard reports shown in table 14.2. The report depends on the value of the items **Terminal mode** and **VT300 terminal id** on the General Configuration screen.

To override all the standard Secondary Device Attribute reports and define your own report:

- At the "ZSTEM?" prompt, type **SECONDARY** and press RETURN. You can shorten this to **SEC**.
- The following will be displayed:

  ```
  Key: <Secondary Attributes>
  ```

  Enter the desired character sequence for the new Secondary Device Attribute report. Entry is the same as for regular softkey definitions. Refer to the section "Editing Your Softkey Definition" in Chapter 11. To terminate entry and editing press ALT+T.

Note: An incorrect device attribute response may cause a host to fail to recognize your "terminal".

Answerback

The answerback is the character sequence automatically sent to the host when an ASCII ENQ (CTRL-E) is received from the host. By default, ZSTEM will not send a response to ENQ.

To change the answerback sequence:

- At the "ZSTEM?" prompt, type **ANSWERBACK** and press RETURN. You can shorten this to **ANS**.
- The following will be displayed:

  ```
  Key:  <Answerback>
  ```

Enter the desired answerback sequence. Entry is the same as for regular softkey definitions. Refer to the section "Editing Your Softkey Definition" in Chapter 11. To terminate entry and editing press ALT+T.

TABLE 14.2
Standard Secondary Device Attribute Reports

Terminal mode	VT300 terminal id		Standard Secondary DA report
VT300/7-bit	VT340		ESC [>24;11;0c
VT300/7-bit	VT220	*	ESC [>1;20;0c
VT300/8-bit	VT340		CSI >24;11;0c
VT300/8-bit	VT220		CSI >1;20;0c
VT100			ESC [>1;20;0c
*	1	VT220	
	20	firmware version 2.0	
	0	no options	

Reference

Local Help

ZSTEM has a special variation of local mode, known as Local Help mode. This feature allows you to write softkey programs which display your own "help windows" specific to your application. The major difference between regular local mode and Local Help mode is that when you enter Local Help mode, the current screen is saved (though not cleared), and when you exit Local Help mode, the saved screen is restored.

To enter Local Help mode:

- At the "ZSTEM?" prompt, type **LOCAL H** and press RETURN. You can shorten this to **LO H**.

Data from any softkey programs that you execute, or keys that you press, will be displayed on your screen and not sent to the host. Data received from your host will be buffered. If necessary, ZSTEM will send an XOFF (ASCII DC3) to your host to stop incoming characters.

If you wish to clear the screen, you should do this after entering Local Help mode, so that the previous contents will be saved. Appendix B contains control sequences to clear the screen.

To exit Local Help mode and return to emulation mode, you must enter and then leave ZSTEM command mode; either from a softkey, or directly from your keyboard.

Local Help mode can overlay part of the screen display with a "help window." Three ZSTEM special escape sequences have been provided to assist users defining help windows:

Draw Help Window

The sequence CSI 1; Pn;Pn .z will draw a window of size height;width. The window will be positioned so that the current cursor position is at the top left of the window.

Clear Help Window

The sequence CSI 4 J will clear the last window which was drawn. The cursor position will not be changed.

Reference

New Line in Help Window

The sequence CSI E will position the cursor at the start of the following line in the most recently drawn help window. The current position must be inside that window.

In Local Help mode, the terminal remains in its current mode, either ANSI or VT52. If it is in ANSI mode, you can change the scrolling region, origin mode, and character set (e.g. DEC special graphics, IBM graphics) for use in the window, as they will be restored to their previous values when you return to on-line mode. In both ANSI and VT52 mode the display attributes - color, underline, inverse, blink, and bold - will also be restored when you return to on-line mode. You should not use any other ANSI features as they will not be saved and restored. In particular, you should not change between 80 and 132 column mode while in Local Help mode.

The terminal reset control sequences ESC c, CSI z, and CSI ! p are ignored in Local Help mode.

Data Line Monitor

You can use your PC running ZSTEM as a data line monitor. A data line monitor is used to view data that is being sent and received on a communications line.

To do this, you should set the item **Printer to host** on the Text Printer Configuration screen to **Y**, and the item **Printer status** on the same screen to **On**. Or use the PRINTER command. Data received by your "printer" port will be put into the ZSTEM keyboard buffer and sent out the communications port. If you want to see this transmitted data, set the item Local echo on the Session Configuration screen to Y. Data received at the communications port will be displayed and sent out the "printer" port.

To ensure that all data passes through unchanged, you should set the item **Strip escape sequences** on the Text Printer Configuration screen to **N**. You should also set the item **Transparent mode** on the Display Configuration screen to **Y**, to ensure that control and escape sequences are displayed without being acted upon.

You must ensure that the rate of characters arriving at the "printer" port does not exceed the character rate of the device connected to the communications port. You can generally do this by setting the baud rate of the printer port to a value that is lower than the baud rate of the communications port.

Chapter

15

Troubleshooting

Trouble

Introduction

This chapter can help you if you have a problem using ZSTEM. If you find out the "Things You Should Know" as suggested in the next section, and then look through the likely problems in the following section, you may discover the answer to your problem. Or the preceding chapters may contain the information you need. If you still have difficulty, the final section in this chapter tells you how to obtain technical support from KEA Systems, and what you should do before calling KEA.

Things You Should Know About Your PC

Monitor

What type of monitor do you have?

- composite monochrome.
- TTL monochrome, also called "true monochrome."
- composite color, or RGB.
- enhanced color monitor, for the EGA.
- VGA fixed frequency, also called "analog", for the VGA.
- Multisync, with analog or digital interface. Many Multisync monitors have both interfaces:

  Analog interface is used with the VGA only. PC connector is 15-pin.
  Digital interface is used with the EGA. PC connector is 9-pin.

Display Adapter (Video Card)

Is your display adapter a VGA, EGA, CGA, MDA or Hercules? Or is it one of the special adapters listed in Chapter 6? Some adapters have DIP switches to set the display mode. Unless you have selected the Text display driver, ZSTEM uses the adapter in a "graphics" mode.

Trouble

Keyboard

What type of keyboard do you have? Chapter 7 shows the layout of each of the following keyboard types.

- PowerStation, KEA Systems' VT look-alike keyboard.
- IBM PC/XT. This keyboard has 10 FUNCTION keys.

- IBM PC/AT. This keyboard has 10 FUNCTION keys.
- IBM Enhanced. This keyboard has 101 or 102 keys, including 12 FUNCTION keys. It is used on enhanced XT, AT and PS/2 systems.
- Zenith PC.
- Zenith AT.
- LK250, Digital's LK201-like keyboard to plug into PCs.

Communications Port

Are you using a standard serial port: COM1 or COM2?

Or are you using a non-standard serial port: COM3 or COM4? You must configure the correct address and interrupt level for non-standard serial ports. Refer to Chapter 4.

What sort of modem, if any, are you using with your serial port?

If you are communicating via a network, what network software are you running?

Software

Are there any RAM resident (TSR) programs? Is there anything unusual in your CONFIG.SYS or AUTOEXEC.BAT? What version is your DOS? You can find out your DOS version by typing **VER** at the DOS prompt.

Troubleshooting

Problems Getting Started

Error Message On Startup

Determine if it is a ZSTEM error or DOS error. If it is a ZSTEM error and you have already made configuration changes and saved the changed ZSTEM configuration, try copying the original distributed ZSTEM "EXE" file to a different directory on your disk and running this. By not using any special drivers, you may not have the configuration you want, (e.g. the configured value of **Display Adapter** will be **Automatic**) but it should work enough so that you can see if you get the same error. You may need to reinstall ZSTEM. If it is a DOS error, try re-booting your PC from the original MS-DOS disk.

Message "Not enough memory to run" or "Not enough memory to load"

ZSTEM requires more memory than your system currently has available. You must release some memory prior to starting ZSTEM. ZSTEM will run in as little as 220 Kbytes. Refer to "Overlays and Memory" in Chapter 13 for information on memory requirements.

Using ZSTEM with RAM Resident Programs

ZSTEM and some terminate-and-stay-resident (TSR) programs have conflicting requirements for various DOS resources. If you are running resident programs that turn off interrupts (some print spoolers turn off interrupts for extended periods), ZSTEM may lose characters. ZSTEM has several options to increase its compatibility with resident programs. If you suspect that a TSR is interfering with ZSTEM, try

removing all TSRs and run ZSTEM again. You may have to change your CONFIG.SYS or AUTOEXEC.BAT files.

Hardware/Software Scroll

ZSTEM normally uses hardware scrolling. Programs such as SideKick (and some other TSR programs which use the screen) cannot determine that ZSTEM uses hardware scrolling and may be unable to handle the screen and also interfere with ZSTEM's screen handling. Eliminate this problem by setting **Software scroll** to **Yes** on the Display Configuration screen.

Keyboard Handling

ZSTEM normally uses its own internal keyboard handling. This technique can interfere with RAM resident programs that also bypass the BIOS keyboard support. You can use ZKB.COM (ZSTEM's external resident keyboard handler) to provide full ZSTEM keyboard support and yet prevent interference between ZSTEM and some RAM resident programs. You can alternatively use the B switch so that ZSTEM uses BIOS keyboard support; however this may restrict ZSTEM's keyboard remapping. Refer to Chapter 13 concerning the use of ZKB and BIOS keyboard support.

If you find that your TSR Screen Saver program no longer works, ZSTEM may be intercepting the keyboard input which the Screen Saver program is looking for. Try the alternative keyboard handling methods described above, or use ZSTEM's own screen saver feature described in Chapter 6.

Display (Monitor and Adapter)

Message "Unsupported Display Adapter"

If you get the message "Unsupported Display Adapter" when you start ZSTEM, check that ZSTEM supports your adapter, or that your adapter is truly IBM register-compatible. If you have already made configuration changes and saved the changed ZSTEM configuration, try copying the original distributed ZSTEM "EXE" file to a different directory on your disk and run this. By not using any special drivers, you may not have the configuration you want, (e.g. the configured value of **Display Adapter** will be **Automatic**) but it should work to some degree. For VGAs try

```
> zstem320 /d:VGA-like
```

EGA with Monochrome Monitor Does Not Work

For EGAs with monochrome monitors and EGAs having less than 256K of on-board memory, the **Automatic** value of **Display Adapter** will not work. You must use a special driver for these cases.

Display Has No Color, Is Low Resolution Only

A CGA in graphics mode has only one color, and no high resolution. The PS/2 Model 30 normally has a MCGA adapter. With a special driver, ZSTEM produces higher resolution (640x480) on a MCGA, but only one color.

No 800x600 Resolution

Some VGAs have 800x600 high resolution, but only with an external ZSTEM driver. You need a multisync monitor to display this resolution. Check that ZSTEM supports your adapter.

Monochrome Monitor Has No Gray Scale

ZSTEM cannot produce gray scale on a composite monochrome monitor. The only monochrome monitor which can produce gray is a true monochrome or TTL type.

When Scrolling, Screen Blanks or Becomes Corrupted

ZSTEM generally uses high speed hardware scrolling. On some display adapters, this hardware scrolling technique may not work properly and your screen may go blank, or lose characters after a scroll operation. You may find that your log-on gets to the bottom of screen, and then stops. This occurs on some portables.

You can usually eliminate this problem by choosing software scroll; unfortunately this will slow throughput. Set **Software scroll** to **Yes** on the Display Configuration screen. Or use the S command line switch.

To test if scrolling is the problem: go into LOCAL mode, then press CTRL+J until you reach the bottom of the screen. Observe what happens when the display attempts to scroll.

Monitor Loses Synch In 132 Column Mode

Check that you have selected the correct value of **Display Adapter** on the Display Configuration screen. Do not use a "multisync" value unless you have a multisync monitor. Also check that DIP switches on the display adapter are correctly set for your monitor type. Try a different PC.

Duplicated Characters

Check **Local echo** on the Session Configuration screen.

Screen Is Corrupted When TSR Is Invoked

If you find that the screen is corrupted when you invoke a TSR within ZSTEM, try using the HOTKEY command before invoking the TSR. Refer to Chapter 13.

Characters Badly Corrupted at All Times

By default, ZSTEM emulates a VT320 terminal with 8 data bits and no parity bit. If you then access a host which is using 7 data bits and 1 parity bit, your screen will appear badly corrupted. This is because ZSTEM is interpreting the parity bit as the eighth data bit, and is consequently displaying special characters from the upper half of its character set. If this occurs, change your parameters so that ZSTEM also is in a "7-bit environment". On the session Configuration screen, you must correctly set the items **Data bits** and **Parity**. Or you could set **Terminal mode** on the General Configuration screen to **VT100**, because a VT100 is always in a "7-bit environment".

ZSTEM Fails On a Single PC

ZSTEM may not run properly on a particular PC, but does run on others, even though all apparently have the same adapter. Check the version numbers of the display adapter ROMs. Ensure that the adapter switches are set correctly.

National Character Set Reverts to ASCII Set

There is an ANSI escape sequence **Esc (B** which loads the ASCII set into G0. Some application programs send it to restore "normal" characters after temporarily loading a special graphics set in G0. This works fine in Multinational mode. However, if your **Character set mode** is **National**, you probably don't want ASCII loaded. Your "normal" character set is one of the National Replacement Sets. Set the item **Default foreign font** on the Display Configuration screen to **National**. Then **Esc (B** will instead load into G0 your current NRC set, named in the item **Keyboard language** on the General Configuration screen.

Keyboard

Some Keys Do Not Work

Ensure the correct value of **Type** is selected on the Keyboard Configuration screen. Check the value of **VT300 terminal id** on the General Configuration screen; perhaps the host does not recognize your terminal type. Check the keyboard layouts in Chapter 7.

A Particular Key Does Not Work

Try using the key in a softkey definition, just to see how ZSTEM recognizes it. If possible, try using the key in DOS, to see how DOS recognizes it. The key switch could be broken.

Alt-Z Does Not Produce "ZSTEM?" Prompt

If ALT+Z does not produce the "ZSTEM?" prompt, ensure the item **Keyboard language** on the General Configuration screen corresponds to the markings on your keycaps. Perhaps Z is in a different location. Make sure you have not assigned a softkey to ALT+Z.

SetUp Does Not Produce "ZSTEM?" Prompt

If ALT+Z produces the "ZSTEM?" prompt, but SET UP does not, ensure the item **Type** on the Keyboard Configuration screen is correct. Not all keyboard layouts have a SET UP key.

The "Minus" Key on an Enhanced Keypad Does Not Work

On the enhanced keyboard, the keypad minus and comma are combined on one key. Try SHIFT with that key.

Backspace Key Does Not Work

The BACKSPACE key normally sends a DEL code. If your application needs a BS code, use SHIFT+BACKSPACE or remap the key so that it sends BS. An example in Chapter 7 shows how to remap this .

PrintScreen Key Does Not Work

If PRINT SCREEN and other keys don't work, read Chapter 8 to determine the correct key combination to perform your print-screen task; some tasks require the SHIFT, CTRL, or ALT keys. Try putting ZKB, ZSTEM's resident keyboard handler, in your AUTOEXEC.BAT, or try removing other resident programs.

Arrow Keys Do Not Work on Enhanced Keyboard

If the arrow keys do not work on an enhanced keyboard, perhaps your keyboard does not function as a real IBM Enhanced keyboard. Try using the keys in a softkey definition, just to see how ZSTEM recognizes them. You may have to change the value of **Type** on the Keyboard Configuration screen.

Arrow Keys Send Numbers Instead

If the N switch is in effect, you may find that the arrow keys on some keyboards transmit numbers rather than cursor control codes. In this case, you should not use the N command line switch. Use U to cancel N in a saved configuration.

Communication Port

Cannot Talk to Modem

Check baud rate and other serial port items on the Session Configuration screen. Check that echoback is set in your modem; the Hayes command ATE1V1 turns on echo and verbose mode. Consult your modem manual on switch settings. If you are using COM3 or COM4, check the hardware settings; ensure they match the values you loaded with the COM3 or COM4 commands.

Modem Fails with ZSTEM, but Works with Other Software

Check as above. Also determine how the other software uses the port/modem. ZSTEM uses hardware interrupts for both transmit and receive. Ensure you have configured your modem correctly.

Processor Hangs With Additional COM Port

ZSTEM uses hardware interrupts; many other programs don't. So if you have installed an "Additional COM" board at an unsuitable interrupt level, there will be no conflict until you run ZSTEM; then the PC may hang. Instructions with the COM board should tell you about the correct interrupt level.

Cannot Hang-up Modem
Some internal modems have a set-up option to select whether DTR low causes hangup. Refer to the modem's manual and configure your modem so that it hangs up when DTR is low.

Connection Lost When ZSTEM Exits
Examine the item **Restore port**. Check cabling for floating lines (e.g.: ensure Carrier Detect is connected at both ends).

ZSTEM Hangs When Reentering a Session
The host may be hung, not ZSTEM. On VMS, press CTRL+Y.

Selecting a Network Port Produces "Port initialization failure" Message
The problem could be: network software not loaded and initialized; network connection limit reached by other connections; not enough memory to load the ZSTEM network driver.

Entering a Network Name Produces "Name is undefined/unavailable" Message
The problem could be: service name incorrect; name server is not responding; service is not responding; network connection limit reached. After you enter a network name, ZSTEM may take a minute or so to make a connection on some networks.

No LAT Services Available or Too Few Services
Consult your PC LAT installation guide; check that required LAT modules are resident, and that you have sufficient service slots. The default number may be less than you require. For more information, talk to your system manager.

ZSTEM Runs, but Cannot Communicate with Host
If ZSTEM starts, displays the initial screen and responds in command mode but will not respond in terminal mode, and ZSTEM runs OK otherwise:

- Ensure that you have configured the correct serial port on the Session Configuration screen.
- Check baud rate, parity, availability of network services.
- Check cabling; try a different cable.
- If you are connecting directly to a local computer, you require a "null modem" cable.
- Try a different serial port.
- Try ZSTEM on another PC.
- Connect PC-to-PC, ZSTEM-to-ZSTEM.
- Try loop-back on serial ports.

- If using an internal modem, check interrupts; you may have a conflict.
- Try removing other serial ports.
- Try connection to another terminal or emulator; check bi-directional flow.
- Talk to your system manager.

Characters Lost

ZSTEM's throughput may be reduced by resident programs. If the TSR turns interrupts off for extended periods, incoming characters can be lost. Refer to "Using ZSTEM with RAM Resident Programs" in this chapter.

Softkey Generated Characters Are Occasionally Lost

ZSTEM outputs softkey strings at the set data rate. If the host recognizes characters you type but softkey generated characters are occasionally lost, probably the host cannot accept characters at the configured baud rate. You can reduce the effective data rate if you change the item **Intercharacter delay** on the Session Configuration screen. Try setting it to 10 or 20 milliseconds, causing a slight pause between each character.

Problems at High Baud Rates

ZSTEM normally transmits all data at the baud rate specified. Some hosts cannot accept data at high baud rates; this may cause problems with file transfers, softkey-generated data, or reports that the host requests. An item on the Session Configuration screen **Intercharacter delay** reduces the effective baud rate for transmitted data. If you have problems at high baud rates, but the same operations work at low baud rates, try setting **Intercharacter delay** to a non-zero value. The value 4 ms will limit transmission to about 240 characters/second. (When enabled, the DEC VT320 terminal Set-Up option "Transmit rate limiting" limits the terminal rate to about 240 characters/second.)

Printer

PRINT SCREEN Key Does Not Work

Refer to Chapter 8. Many print-screen operations require SHIFT, CTRL and ALT combinations. Perhaps the problem is not in ZSTEM; in DOS, try to copy a file to PRN. Check the items on your Text Printer Configuration screen.

Serial Printer Does Not Work At All

If your serial printer fails to work in DOS and in ZSTEM, the problem may be in the cabling . You normally connect a "null modem" cable between your PC and a serial printer.

ZSTEM Hangs on Print Request

If printing is turned on, but the printer is not ready (off-line or improperly connected), ZSTEM may hang when it tries to send data to the printer.

Printer "Noise" or Printer Changes Mode

If your printer occasionally prints nonsense or goes into a different mode (e.g., bold or underline), ZSTEM may be passing to the printer all incoming escape sequences which do cursor control and mode setting on the screen. Most printers react differently from ZSTEM to these escape sequences. You can stop the escape sequences from being passed onto the printer by setting the item **Strip escape sequences** to **Y** on the text and graphics printer configuration screens.

Faulty Printing When Using BIOS Keyboard Support

If you are running ZSTEM with BIOS keyboard support (command line switch B), and you request a print screen operation with PRTSC, the ROM Print Screen routine may attempt to dump the screen, producing garbled or no data. Refer to Chapter 13 concerning BIOS keyboard support.

File Transfer Problems

Kermit Transfer Fails, or Kermit Loses Eighth Bit

ZSTEM's Kermit automatically detects binary data in a received file, but VMS Kermit must be explicitly told that a file is "binary." Check the VMS Kermit configuration.

Failure in Transaction Log

When sending the transaction log to a disk, be sure that the disk containing the transaction log remains in the drive while the transfer is underway. Do not put the transaction log on a disk that you replace with a disk containing the file to be transferred!

Error "Record Length Too Long" on VMS

If Kermit on VMS gives this error, it is probably not buffering the received packets correctly. Try lowering **Tx packet length** on the Kermit Configuration screen; even to 32 bytes.

Other Problems

Error "Cannot save ZSTEM"

If this error appears when you try to save a ZSTEM configuration:

- Ensure there is room on the disk;
- Ensure DOS is installed correctly. If you are unsure, re-boot from your original MS-DOS distribution disk and try the save again.

Processor Hangs with Additional COM Port

ZSTEM uses hardware interrupts; many other programs don't. So if you have installed an "Additional COM" board at an unsuitable interrupt level, there will be no conflict until you run ZSTEM; then the PC will hang. Instructions with the COM board should tell you about the correct interrupt level.

Some PCs Work with ZSTEM, Others Do Not

Even though all PCs seem identical, there may be hardware differences between some of them. Try to isolate and identify the differences by changing various boards.

ZSTEM Hangs When Referencing a Logical Drive

If you are using a single-drive system and attempting to reference a logical drive, ZSTEM may appear to hang. This is because the DOS prompt to "exchange disks" may not be visible. However, your keyboard response will still work.

ZSTEM Does Not Run, But Slower Terminal Emulators Do

ZSTEM obtains much of its high performance from being interrupt-driven (some other terminal emulators are not). There must be no interrupt conflicts on the serial ports. If you have multiple serial ports or a serial port and an internal modem, check the option switches and straps to ensure that the COM port you are using for ZSTEM is optioned correctly. Refer to the operations manual for your serial ports and modem. Check the configuration used by the other software.

"Error Opening Input File" When Writing to Disk

If you cannot save ZSTEM because you get "error opening input file" when writing to disk:

- It may be a problem with DOS not being installed properly. Re-boot from your original MS-DOS disk.

- Or it may mean that ZSTEM can't find the previously-loaded image to read before writing the current configuration. Copy the original ZSTEM "EXE" file to your disk, run it and try to save that.
- Try removing TSR programs.

Technical Support from KEA

KEA Systems is available from 8 a.m. to 5 p.m. (Pacific Time) Monday through Friday to provide technical support to registered ZSTEM users. We require that you are a licensed user, and that you have sent in a completed registration card. We also ask that you read and follow through the next two sections before you call or FAX us at the numbers given in the front of this manual.

Before You Call KEA Technical Support

Before you call KEA Technical Support, it would be helpful to isolate the problem as much as you are able.

If data, particularly control sequences, are not being received correctly, the item **Transparent mode** on the Display Configuration screen allows you to "see" control sequences without ZSTEM acting on them. This helps to isolate faulty or missing controls.

You can capture the data your host is sending onto disk, which will allow you to later replay and examine it in detail. This procedure is explained in Chapter 9.

Attempt to identify your problem exactly:

- Is it a display problem? communications?
- When does the problem occur?
- Is it machine-dependant?

You should also try the following:

- Remove TSR utilities from memory.
- Make sure all cables are firmly attached.

- Re-boot the computer and try again.
- Repeat all steps, following instructions in the manual.
- If you change DIP switches, write down the original settings.
- Check this manual, and see if your problem is listed in this chapter.
- Try doing the procedure on another system.
- Compare ZSTEM's requirements to your hardware configuration.
- Ask your system manager.

When You Call KEA Technical Support

When you call for Technical Support, you should have the following ready at hand:

- Your computer, so that you can try suggested solutions.
- A pencil and paper to write down the technician's name and any instructions. If you have to call back, it will be more efficient to talk to the same person.
- Your computer's make, model, and configuration: RAM installed, display adapter, printers attached, etc.
- A list of any TSR utilities installed.
- Your current CONFIG.SYS and AUTOEXEC.BAT files.
- Your MS-DOS or UNIX operating system version.
- Your ZSTEM version and ZSTEM serial number.
- A description of exactly what the problem is, and the sequence of events that causes the problem.
- A list of solutions you have tried.

Trouble

Appendix

A

Configuration Screen Items, Switches and Commands

General Configuration (G)

```
                         General Configuration

Config file: zstem320.cfg  (Missing)
 10. Terminal mode: VT300/7-bit  VT300/8-bit  VT100  VT52
 11. VT100 terminal id: VT320  VT220  VT100  VT101  VT102
 12. VT300 terminal id: VT320  VT220
 13. Keyboard language:   North American
 14. User Preferred Supplemental: DEC-MCS  ISO Latin 1  IBM Graphics
 15. Character set mode: Multinational  National
 16. Online mode:      Online  Local
 17. User keys locked:              N
 18. User features locked:          N
 19. New line mode:                 N
 20. Remote softkeys:               Y
 21. Warning bell:                  Y
 22. Terminate on error:            N
 23. Clear:              Display  Comm
 24. Reset terminal:              Yes
 25. Automatic command mode menu:   Y
 26. Macrograph report:             Y
 27. Old ZSTEM private controls:    N       Configuration Screens, N = next
 28. Autoconnect                    Y     G. General    D. Display    A. ASCII
 29. Sixel scrolling                Y     S. Session    B. Keyboard   K. Kermit
                                          P. Printer    C. Color      X. Xmodem
 Select item?
```

Figure A.1. General Configuration screen

> The index at the end of this manual contains additional references to each configuration screen item. See under the individual item name.

Config file
The configuration file from which the current configuration was taken. If the file was not found, "Missing" appears on the screen. p.46

10. Terminal mode
The major mode of operation. What kind of terminal you are emulating. p.86

11. VT100 terminal id
How the terminal identifies itself when in VT100 mode. p.86

12. VT300 terminal id
How the terminal identifies itself when in VT300 mode. p.86

13. Keyboard language
Determines the language-layout of your keyboard. Choose this to match your keyboard markings. p.109, 134

14. User Preferred Supplemental
The default display character set in the range 128 to 255. Must conform to host. p.109, 134

15. Character set mode
Affects how non-ASCII characters are coded. Must conform to host. p.109, 134

16. Online mode
In local mode, your terminal sends only to itself. This can also be changed with the LOCAL command. p.79

17. User keys locked
Shifted Function keys cannot be reprogrammed by host. p.92, 141

18. User features locked
Certain user-preference options cannot be changed by host. p.92

19. New line mode
Affects what the Return key sends, and how received "new line" controls are displayed. p.92, 140

20. Remote softkeys
Whether or not the host can execute a softkey. p.271

21. Warning bell
Whether or not the terminal "beep" is enabled. p.90

22. Terminate on error
Whether or not ZSTEM exits when an error occurs in command mode. p.297

23. Clear
Clears the screen, or clears the communications port. p.80, 116

24. Reset terminal
Resets the terminal features to default settings. p.92

25. Automatic command mode menu
Whether or not the HELP screen appears whenever you go into ZSTEM command mode. p.30

26. Macrograph report
not used

27. Old ZSTEM private controls
Whether ZSTEM interprets certain control sequences as old ZSTEM controls, or new ANSI controls. p.384

28. Autoconnect
Whether ZSTEM immediately connects to the configured port, or waits for you to give the OPEN command. p.70

29. Sixel scrolling
not used

Session Configuration (S)

```
                              Session Configuration

10. Session 1 name: FirstSession
11. Port:      Com1   12. Name: n/a
13. Baud rate:              9600
14. Data bits:                 8
15. Stop bits:                 1
16. Parity:                 None
17. Protocol:           Xon/Xoff
18. Local echo:                N
19. Intercharacter delay:      0 ms
20. Reset on startup:          N
21. Restore port:           Exit
22. Modem disconnect delay: 60 ms   2 sec  2 sec(Linedrop)  No Disconnect
23. Hardware flow:          None
24. Receive Xoff point:      896         Modem signals: RTS DTR
                                         Flow control state:  Receive ready
                                                              Transmit ready


                                           Configuration Screens, N = next
                                         G. General   D. Display    A. ASCII
                                         S. Session   B. Keyboard   K. Kermit
                                         P. Printer   C. Color      X. Xmodem
Select item?
```

Figure A.2. Session Configuration screen (for a serial port)

10. Session N name
The current session number and name. A different Session Configuration screen exists for each open session. p.77

11. Port
The port used to communicate with the host in the current session. p.55

12. Name
External name or address of a network connection. p.60

13. Baud rate
Data rate of a serial port. Can also be changed with the BAUD command. p.56

14. Data bits
Number of data bits in a serial port word, excluding stop and parity bits. p.56

15. Stop bits
Number of stop bits at the end of a serial port word. p.57

16. Parity
Sending and receiving parity for a serial port. p.57

17. Protocol
Whether or not Xon/Xoff is used. p.57

18. Local echo
Whether or not transmitted characters are also displayed. p.81

19. Intercharacter delay

Optional pause between sent characters: normal keyboard characters, simple file transfer, characters sent as part of an executing softkey. p.81

20. Reset on startup

Optional reset command sent to a port when the session is opened p.70

21. Restore port

Controls if the port is restored to its pre-ZSTEM state when ZSTEM exits, or when you run a system command, or not at all. p.74, 294

22. Modem disconnect delay

(serial port only) How long the modem can detect carrier loss before ZSTEM quits the session. p.73

23. Hardware flow

(serial port only) Which control lines if any are used for hardware flow control. p.57

24. Receive Xoff point

(serial port only) The point at which the receive buffer is considered "full." p.57

Modem signals

(serial port only) Which RS-232 modem control lines are active. Display only. p.59

Flow control state

(all ports) Whether transmit and receive are ready or blocked. p.58

```
                          Session Configuration

10. Session 1 name: FirstSession
11. Port: Telnet/X   12. Name: NUL
13. Baud rate:                9600     Special Characters
14. Data bits:                   8      40. NewLine:    CR   41. Literal:    ^V
15. Stop bits:                   1      42. Erase:     DEL   43. EraseLine:  ^U
16. Parity:                   None      44. EraseWord:  ^J   45. Reprint:    ^R
17. Protocol:             Xon/Xoff      46. Synch:     off   47. Break:      ^Y
18. Local echo:                  N      48. Interrupt:  ^C   49. AbrtOutpt:  ^O
19. Intercharacter delay:        0 ms   50. AYT:        ^T
20. Reset on startup:            N
21. Restore port:             Exit      60. Terminal type negotiation:      All
30. Remote Telnet port:         23      61. Use DEC-xxx type names:           N
31. Tie output mode to:       Echo
32. Output mode: Character    Line       Session is not connected
33. Send synch with IP, etc:     Y       Flow control state: (port not open)
34. Initiate option setup:       Y
35. Tie binary to 8-bit data:    N
36. Show network data in hex:    N
37. Show option negotiation:     N         Configuration Screens, N = next
38. Char paired with <CR>:    <LF>      G. General    D. Display    A. ASCII
39. Local char interpretation:   N      S. Session    B. Keyboard   K. Kermit
                                        P. Printer    C. Color      X. Xmodem
Select item?
```

Figure A.3. Session Configuration screen (for a Telnet port)

30. Remote Telnet port

(Telnet port only) Port number. p.65

31. Tie output mode to

(Telnet port only) How host signals client to switch between character mode and line mode. p.65

32. Output mode

(Telnet port only) Transmit a character at a time, or a whole line at a time. p.66

33. Send synch with IP, etc

(Telnet port only) Whether or not a synch sequence is sent with a signal which interrupts the host. p.66

34. Initiate option setup

(Telnet port only) Whether or not ZSTEM can initiate option negotiation. p.66

35. Tie binary to 8-bit data

(Telnet port only) How 8-bit data is sent. p.67

36. Show network data in hex

(Telnet port only) A debug mode. p.67

37. Show option negotiation

(Telnet port only) A debug mode. p.67

38. Char paired with <CR>

(Telnet port only) How a newline is sent. p.67

39. Local char interpretation

(Telnet port only) Whether special characters are interpreted by ZSTEM or left for the host to interpret. p.67

40. NewLine
41. Literal
42. Erase
43. EraseLine
44. EraseWord
45. Reprint

(Telnet port only) The above 6 items define characters which have special functions. p.69

46. Synch
47. Break
48. Interrupt
49. AbrtOutpt
50. AYT

(Telnet port only) The above 5 items define characters which send special network control sequences. p.70

60. Terminal Type Negotiation

(Telnet port only) Whether ZSTEM negotiates with the host among all possible terminal types, or only one terminal type. p.67

61. Use DEC-xxx type names

(Telnet port only) Whether to use the long or short form of terminal indentifiers. p.69

Session is (not) connected

(networks only) Indicates whether or not the network session is connected. Display only. p.60

Text Printer Configuration (P)

```
                         Text Printer Configuration

10. Type:           IBM Graphics
11. Port:       Lpt1  12. Name: n/a
13. Baud rate:              9600
14. Data bits:                 8
15. Stop bits:                 1
16. Parity:                 None
17. Protocol:           Xon/Xoff
18. Etx/Ack packet size:      32
19. Ready state:            DSR1
20. Reset on startup:          N
21. Data type: DEC Multinational
22. Strip escape sequences:    N
23. FF at print page end:      N
24. Printer to host:           N
25. Print amount:  Page  Region
26. Mode:  Normal  Auto  Controller
27. Printer status:     Off  On

                                      Configuration Screens, N = next
                                    G. General   D. Display    A. ASCII
                                    S. Session   B. Keyboard   K. Kermit
                                    P. Printer   C. Color      X. Xmodem
Select item?
```

Figure A.4. Text Printer Configuration screen

10. Type

Type of printer you use for printing text. p.162

11. Port

Physical port, or DOS port, connected to text printer. p.163

12. Name

Filename, or network port service name. p.166

13. Baud rate

14. Data bits

15. Stop bits

16. Parity

17. Protocol

18. Etx/Ack packet size

19. Ready state

The above 7 items select the port parameters of a serial text printer port. p.164

20. Reset on startup

Whether or not a reset is sent to the text printer port when ZSTEM starts. p.163

21. Data type

Affects characters being printed in a print-screen request, or autoprint command. It controls how they are interpreted. p.170

22. Strip escape sequences

Affects characters being printed as they are received, in printer controller mode, or by the PRINTER command. Controls whether or not ZSTEM translates the character stream for your printer type. p.169

23. FF at print page end

Controls whether or not a formfeed is sent to the printer after a print-screen request. p.170

24. Printer to host

Whether or not the printer can send control information to the host. p.327

25. Print amount

Controls whether a print-screen request prints the screen or only the scrolling region. p.170

26. Mode

Turns on printer in either Autoprint (display and print line-by-line) or Printer Controller (print only) mode. p.168

27. Printer status

Turns printer on directly for simultaneous display and printing. Equivalent to PRINTER command. p.169

Display Configuration (D)

```
                    Display Configuration

10. Display Adapter:          Automatic
11. Smooth scroll:                N
12. Smooth scroll delay:         20
13. Software scroll:             No
14. Cursor Style:  None  Block  Underline
15. Screen:            Normal  Reverse
16. Transparent mode:             N
17. Columns:                  80  132
18. Auto wrap mode:               N
19. Reset screen on DOS call:     Y
20. Rows (character lines):      24
21. Window back buffer request:  Min  Max
22. Default foreign font:  ASCII  National
23. Screen resolution:  Normal  80-Normal/132-High  High
24. Maintain aspect ratio:        N
25. CRT saver timeout:            5 min.
26. CRT saver: Disabled  Blank  Pattern
27. Graphics cursor:              Y
28. Text code page:          Country      Configuration Screens, N = next
29. Status display:             None    G. General   D. Display    A. ASCII
Hold Screen Off                         S. Session   B. Keyboard   K. Kermit
                                        P. Printer   C. Color      X. Xmodem
Select item?
```

Figure A.5. Display Configuration screen

10. Display Adapter
Selects your video adapter and monitor combination. p.96

11. Smooth scroll
Selects smooth-scroll or jump-scroll. p.111

12. Smooth scroll delay
Controls rate of smooth scroll. p.111

13. Software scroll
Some hardware configurations cannot hardware-scroll properly. p.112

14. Cursor Style
Selects the type of text input cursor. p.118

15. Screen
Controls normal or reverse-video screen. p.117

16. Transparent mode
If set, all control characters are shown on the screen. No special action taken. p.118

17. Columns
Number of columns visible on the screen. p.101

18. Auto wrap mode
Controls whether or not a line which exceeds 80 (or 132) columns wraps to the next line. p.118

19. Reset screen on DOS call

Whether or not the display adapter reverts to text mode when you call a system program. p.296

20. Rows (character lines)

Number of text lines visible on the screen. p.101

21. Window back buffer request

Controls how many lines of scroll-back are available when you use the WINDOW command. p.113

22. Default foreign font

A ZSTEM feature which loads the current National Replacement Character set into G0 (instead of ASCII into G0) when the terminal receives "Esc (B". p.110

23. Screen resolution

Controls when the screen is in low or high resolution mode. p.102

24. Maintain aspect ratio

Whether the screen uses all its available horizontal lines; or uses fewer lines and maintains correct VT aspect ratio. p.102

25. CRT saver timeout

Selects the idle period after which the screen saver feature, if enabled, blanks the terminal screen. p.114

26. CRT saver

Whether or not the screen saver feature is enabled, and optionally displays a moving pattern after blanking. p.114

27. Graphics cursor

Not used.

28. Text code page

Code page used for display characters when video adapter is in text mode. Also affects character translation. p.97

29. Status display

Controls the VT terminal status line on the bottom of the screen. p.117

Hold Screen

Indicates whether or not the terminal is in "Hold Screen" state. Display only. p.111

Color Palette Configuration (C)

```
                         Color Palette Configuration
Color Index          Red Green Blue Mono
 0. (Background)      0     0    0    0
 1.                  20    20  100   27
 2.                  90    20   20   53
 3.                  20    92   20   84
 4.                  92    20   92   13
 5.                  20    90   90   40
 6.                  94    94   20   75
 7. (Foreground)     67    67   67   67
 8.                  33    33   33    7
 9.                  33    33   67   33
10.                  67    27   27   60
11.                  30    70   30   87
12.                  67    33   67   20
13.                  33    70   70   47
14.                  73    73   27   73
15. (Bold)          100   100  100  100
                                                   F. Attribute color map

20. Restore palette to: Default  Saved
21. VGA colors:      Standard DAC               Configuration Screens, N = next
22. Color map:  Color  Monochrome             G. General   D. Display   A. ASCII
23. Enable ISO color mode:      Y             S. Session   B. Keyboard  K. Kermit
                                              P. Printer   C. Color     X. Xmodem
Select item?
```

Figure A.6. Color Palette Configuration screen

0 to 15. Color Index
Adjusts the color of each of the 16 color indexes. p.104

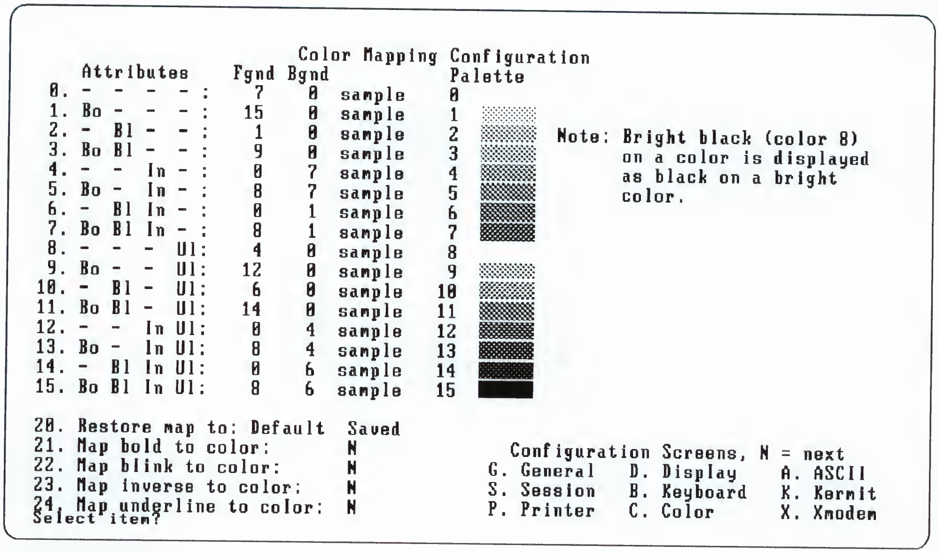
20. Restore palette to
Change color indexes back to their original (distributed) values, or their most recently saved values. p.105

21. VGA colors
Controls the range of VGA colors: 256K colors, or 64 colors, or 16 colors. p.105

22. Color map
Controls whether the color indexes are derived from the combined values in the Red, Green, and Blue columns, or from the gray levels in the Mono column. p.104

23. Enable ISO color mode
Controls whether or not ZSTEM obeys ISO color escape sequences. p.106

Color Mapping Configuration (F)



```
                              Color Mapping Configuration
     Attributes        Fgnd Bgnd                 Palette
 0. -  -  -  - :         7    0   sample          0
 1. Bo -  -  - :        15    0   sample          1
 2. -  Bl -  - :         1    0   sample          2        Note: Bright black (color 8)
 3. Bo Bl -  - :         9    0   sample          3              on a color is displayed
 4. -  -  In - :         0    7   sample          4              as black on a bright
 5. Bo -  In - :         8    7   sample          5              color.
 6. -  Bl In - :         0    1   sample          6
 7. Bo Bl In - :         8    1   sample          7
 8. -  -  -  Ul:         4    0   sample          8
 9. Bo -  -  Ul:        12    0   sample          9
10. -  Bl -  Ul:         6    0   sample         10
11. Bo Bl -  Ul:        14    0   sample         11
12. -  -  In Ul:         0    4   sample         12
13. Bo -  In Ul:         8    4   sample         13
14. -  Bl In Ul:         0    6   sample         14
15. Bo Bl In Ul:         8    6   sample         15

20. Restore map to: Default  Saved
21. Map bold to color:        N                 Configuration Screens, N = next
22. Map blink to color:       N               G. General    D. Display    A. ASCII
23. Map inverse to color:     N               S. Session    B. Keyboard   K. Kermit
24. Map underline to color:   N               P. Printer    C. Color      X. Xmodem
Select item?
```

Figure A.7. Color Mapping Configuration screen

0 to 15. Attributes

Selects the foreground and background color indexes used to display each combination of the four character attributes. p.107

20. Restore map to

Change mapping colors back to their original (distributed) values, or their most recently saved values. p.107

21. Map bold to color

Controls whether or not characters having the bold attribute are shown as bold, or mapped to the color pairs given in items 0 to 15. p.107

21. Map blink to color

Controls whether or not characters having the blink attribute are shown blinking, or mapped to the color pairs given in items 0 to 15. p.107

21. Map inverse to color

Controls whether or not characters having the inverse attribute are shown inverse, or mapped to the color pairs given in items 0 to 15. p.107

21. Map underline to color

Controls whether or not characters having the underline attribute are shown underlined, or mapped to the color pairs given in items 0 to 15. p.107

ASCII File Transfer Configuration (A)

```
                    ASCII File Transfer Configuration

Current write file: none
 10. Local echo on read:           N
 11. Send new line as: CR  CR-LF  LF
 12. Protocol:  Xon/Xoff  Eob/Ack
 13. Strip Eob on write:           N
 14. Disable Xon/Xoff in Eob/Ack mode:   N
 15. ASCII Eob character:      <CR>
 16. ASCII Ack character:     <XON>
 17. Null line pad character:  off
 18. Interline delay:              0 ms
 19. Strip escape codes:           N
 20. Bell on read end:             Y
 21. Write received CR-LF as: CR-LF  LF
 22. Ctrl/Z is EOF on read:        N
 23. Eob/Ack read window:          1
 24. Translation:               None
 25. Custom mapping file: NUL

                                        Configuration Screens, N = next
                                       G. General   D. Display    A. ASCII
                                       S. Session   B. Keyboard   K. Kermit
                                       P. Printer   C. Color      X. Xmodem
 Select item?
```

Figure A.8. ASCII File Transfer Configuration screen

Current write file
Contains the name of a file (if any) open for data capture. p.182

10. Local echo on read
Set this if you have turned off echo at the host, but still want to see the text you are transmitting with a DISK read. p.179

11. Send new line as
Controls the character(s) sent when a CR-LF occurs during a DISK read. p.179

12. Protocol
Selects the type of flow control during DISK read and write. p.177, 182

13. Strip Eob on write
Controls whether or not Eob characters are written with data during a DISK write. p.183

14. Disable Xon/Xoff in Eob/Ack mode
Controls whether ZSTEM uses both protocols, or only Eob/Ack. p.178, 182

15. ASCII Eob character

16. ASCII Ack character
Selects the actual characters used for "Eob" and "Ack" signals. p.178, 182

17. Null line pad character
If set to other than "off", ZSTEM will never send a completely empty line; it will put this character in an otherwise empty line. p.179

18. Interline delay

To delay a given number of milliseconds after each line during a DISK read. p.178

19. Strip escape codes

If set, during a DISK write no escape sequences are written to the file. p.183

20. Bell on read end

Whether or not the terminal bell sounds at the end of a DISK read. p.179

21. Write received CR-LF as

During a DISK write, controls whether a received CR-LF is written as such, or as LF only. p.183

22. Ctrl/Z is EOF on read

Whether or not a CTRL-Z causes the end of a DISK read. p.179

23. Eob/Ack read window

The number of blocks that ZSTEM will send before it waits for an Ack. p.178

24. Translation

Specifies whether or not character translation is performed, and the host character set used. p.185

25. Custom mapping file

Name of a customized character translation table. p.186

Kermit Configuration (K)

```
                         Kermit Configuration

10. Rx packet start char: <SOH>      40. Control quote character:    #
12. Rx packet length:        506     41. 8th bit quote character:    off
13. Rx timeout (seconds):     10     42. Compression character:      ~
20. Tx packet start char: <SOH>      50. Number of pad chars:        0
21. Tx packet end char:     <CR>     51. Pad character:           <NUL>
22. Tx packet max length:    506     52. Half-duplex turnaround:    off
23. Tx timeout (seconds):      0     53. Turnaround delay (ms):      0
30. Error retry limit:        10     54. Xon/Xoff flow control:      Y
31. Block check: Sum-1  Sum-2  CRC   55. Window request:     8, max: 6
60. File type: Automatic  Binary  Text
61. Add Ctl-z at Text EOF:     N
62. Duplicate file name: Rename  Overwrite  Discard  Rename old
63. Log file:  NUL
64. Use full file path names: N
65. Trace display: None  Packet  Data  Both
66. Translation:              None
67. Custom mapping file: NUL

                                        Configuration Screens, N = next
                                      G. General    D. Display    A. ASCII
                                      S. Session    B. Keyboard   K. Kermit
                                      P. Printer    C. Color      X. Xmodem
Select item?
```

Figure A.9. Kermit Configuration screen

10. Rx packet start char
12. Rx packet length
13. Rx timeout seconds

For packets which ZSTEM receives, the above items select the character which always starts a packet, the maximum packet length, and the maximum time the host will wait. p.216

20. Tx packet start char
21. Tx packet end char
22. Tx packet max length
23. Tx timeout seconds

For packets which ZSTEM sends, the above items select the characters which always start and end a packet, the maximum packet length, and the maximum time ZSTEM will wait. p.216

30. Error retry limit

Controls how many errors can occur before transfer is aborted. p.221

31. Block check

Selects the method of error checking. p.221

40. Control quote character
41. 8th bit quote character
42. Compression character

The above 3 items select the special characters used for control codes, 8-bit codes, and to denote repeated characters. p.219

50. Number of pad chars

51. Pad character

The above 2 items control the number of pad characters (and the character itself) sent before the first packet of a transfer. p.219

52. Half-duplex turnaround

53. Turnaround delay (ms)

The above 2 items control whether or not ZSTEM waits for a turnaround character (and the actual character used) before sending another packet. It can also select a further delay after the character arrives. p.220

54. Xon/Xoff flow control

Whether or not flow control is used. p.220

55. Window request

Number of Sliding Window Protocol buffers p.220

60. File type

Type of file to be sent. p.214

61. Add Ctl-z at Text EOF

Whether or not ZSTEM adds a Ctrl-Z at the end of a received file. p.214

62. Duplicate file name

Controls how filename conflicts on received files are resolved. p.215

63. Log file

If a filename is given, transfer status information will be appended to this file. p.215

64. Use full file path names

Whether or not full MS-DOS path names are sent and received. p.201

65. Trace display

A debug feature. p.221

66. Translation

Specifies whether or not character translation is performed, and the host character set used. p.218

67. Custom mapping file

Name of a customized character translation table. p.186

68. Attribute packets

Whether or not ZSTEM sends attribute packets. p.217

X/Ymodem Configuration (X)

```
                        X/Ymodem Configuration

10. CRC mode selection character: C
11. Protocol option: XModem  XModem-1K  YModem  YModem-G
12. Error retry limit:             10
13. Block wait time (seconds):      7
14. Abort on remote request:        Y
15. Log file:  NUL
16. Trace display:         None  Data
17. File type:           Binary  Text
18. Translation:                 None
19. Custom mapping file: NUL




                                 Configuration Screens, N = next
                               G. General    D. Display    A. ASCII
                               S. Session    B. Keyboard   K. Kermit
                               P. Printer    C. Color      X. Xmodem
Select item?
```

Figure A.10. X/Ymodem Configuration screen

10. CRC mode selection character
Character used as CRC selection character. p.238

11. Protocol option
Selects one of four X/Ymodem protocols. p.230

12. Error retry limit
Controls how many consecutive errors can occur before transfer is aborted. p.238

13. Block wait time (seconds)
Controls the interval ZSTEM will wait for another block after it acknowledges the previous block. p.238

14. Abort on remote request
Whether or not ZSTEM will abort if asked to by host. p.229

15. Log file
If a filename is given, transfer status information will be appended to this file. p.228

16. Trace display
A debug feature. p.238

17. File type
The type of file transferred. p.238

18. Translation
Specifies whether or not character translation is performed, and the host character set used. p.185

19. Custom mapping file

Name of a customized character translation table. p.186

Keyboard Configuration (B)

```
                          Keyboard Configuration

10. Type: XT  AT  Enhanced  STD  ZPC  ZAT  PowerStation  LK250
11. Keypad mode: Numeric  Application
12. Cursor keys: Normal  Application
13. Lock key: Caps Lock  Shift Lock
14. Caps lock/shift interaction:  VT  IBMPC
15. Return sends <CR><LF>:          N
16. Auto repeat:                    Y
17. Default softkey wait time:      1 sec.
18. Default softkey match timeout: 30 sec.
19. Send ASCII in National mode:    N
20. Tab stops: Set  8-Column  Clear-All
........1.........2.........3.........4.........5.........6.........7.........8
        ^       ^       ^       ^       ^       ^       ^       ^
                            .........9.........0.........1.........2.........3.
                            ^       ^       ^       ^       ^       ^       ^

                                         Configuration Screens, N = next
                                       G. General    D. Display    A. ASCII
                                       S. Session    B. Keyboard   K. Kermit
                                       P. Printer    C. Color      X. Xmodem
Select item?
```

Figure A.11. Keyboard Configuration screen

10. Type
Determines default VT key positions. Set this to match your keyboard type. p.122

11. Keypad mode
Whether the numeric keypad generates numbers or control sequences. p.140

12. Cursor keys
Whether the arrow keys send cursor control sequences or application control sequences. p.138

13. Lock key
Whether the CapsLock key affects only the alphabetic keys, or numeric and punctuation keys also. p.138

14. Caps lock/shift interaction
Whether the Shift key works independently of CapsLock; or they cancel one another. p.138

15. Return sends <CR><LF>
Whether the Return key sends CR only, or CR and LF. p.140

16. Auto repeat
Whether or not a key repeats when you hold it down. p.140

17. Default softkey wait time
Duration of a softkey <wait> instruction without a specified time. WAITIME command also changes. p.257

18. Default softkey match timeout
Time-out interval for a softkey host-match or keyboard-match function, when a time-out is not specified. Can also be changed with the WAITIME command. p.260

19. Send ASCII in National mode

Whether a key that has no National eqivalent will be sent to the host regardless (using ASCII code) p.136

20. Tab stops

Set and reset tab stops at any position on the screen. p.140

Commands

ANSWERBACK	Defines the answerback character sequence sent in response to the received inquiry request (Ctrl-E) from the remote port. p.323
BAUD	Sets the communication port baud rate. p.56
COM3 COM4	Changes the device address and interrupt level for the named port. p.59
CONFIGURE	Displays configuration screens and sets ZSTEM operating parameters. p.37
!CONFIGURE	A variation on the CONFIGURE command in which the screens are not shown. p.272
CREATE	Creates a new session. p.77
CWD	Changes the current directory to the one specified. p.48
DESTROY	Closes an existing session. p.78
DIRECTORY	Provides a general service directory for the current session. p.71
DISK	Captures incoming data to a disk file, or transfers a local disk file to the remote system. p.176, 181
!ERROR	Changes the error code returned when ZSTEM exits. p.320
EXIT	Terminates ZSTEM and returns to the operating system. p.36
GET	Loads a new configuration or set of softkey definitions into the resident ZSTEM. p.46, 267
HANGUP	Disconnects a modem (and some networks) from the host. p.72
HELP	Displays help about the ZSTEM commands and the command line switches. p.35
HOTKEY	Prepares to send a Hotkey command to a resident Hotkey program. p.302
KERMIT	Performs file transfer between your computer and the remote system using the Kermit Protocol. p.196
LINEDROP	Programs a softkey which will be executed if the connection to the remote system is lost. p.73
LOCAL	Enables or disables local mode. p.79, 325
MEMORY	Displays memory in use. p.304
NEXT	Changes to the next session. p.77
OPEN	Opens the current session. p.70

PHONE	Maintains a telephone directory and places calls using an autodial modem. p.284
PRIMARY	Changes the standard Primary Device Attribute Report. p.321
PRINTER	Directly enables or disables output to the printer destination. p.169
RRL	Displays the Restricted Rights Legend. p.49
RUN	Invokes another program with an automatic return to ZSTEM upon completion. p.295
SAVE	Saves to disk either the configuration, or the softkey definitions, or the complete ZSTEM program. p.43, 266
SECONDARY	Changes the standard Secondary Device Attribute Report. p.323
SHELL	Temporarily enters the operating system until an EXIT command is given. p.295
SOFTKEY	Programs or deletes a softkey. p.244
STARTUP	Programs the softkey which is invoked when ZSTEM is started. p.269
SWITCH	Changes to a specified session. p.77
TABLE	Dump or Load a character translation table. p.186
TRANSLATE	Translate a text file between the local and host character sets. p.184
TYPE	Displays and optionally prints all currently programmed softkeys. p.266
VIDEO	Suppresses all further display in emulation mode. p.114
WAITIME	Changes the default timing values used during softkey execution. p.257, 260
WINDOW	Scrolls a window backwards to view previously displayed text. p.113
XMODEM	Performs file transfer between your computer and the remote system using the Xmodem Protocol. p.226
YMODEM	Performs file transfer between your computer and the remote system using the Ymodem Protocol. p.226

Command Line Switches

?	Provide help on Command Line Switches.
A	Make all program overlays resident. p.303
B	Use BIOS keyboard handling, instead of internal keyboard handling. p.299
C:*configuration*	Use the named configuration file. p.45
D:*adapter*	Use the named video adapter. p.100
F	Cancel the S switch in a saved configuration. p.112
H	Cancel the R switch in a saved configuration. p.107
I:*nn*	Execute one of 36 softkeys on startup. p.270
L:*nn*	Specify the number of lines of text data on the screen. p.101
N	Force the keypad into numeric mode. p.300
R	Show the bold attribute as reverse video. p.107
S	Use software, not hardware scroll. p.112
U	Cancel the N switch in a saved configuration. p.300
Z	Cancel the B switch in a saved configuration. p.299

Appendix

B

ANSI Controls

The following ANSI functions are available when the item **Terminal mode** on the General Configuration screen is set to **VT300/7-bit**, **VT300/8-bit**, or **VT100**.

Some of the controls in this appendix are not standard ANSI, but are extended ANSI. These include DEC private and ZSTEM private ANSI-compatible extensions.

You can also perform some of the control functions from various ZSTEM Configuration screens.

ZSTEM supports most of the functions of the VT320 terminal. Refer to chapter 5. ZSTEM does not support the following VT320 features:

- simultaneous display of dual sessions,
- local editing.

Received ANSI Codes

The following conventions are used:

Pn	A single numeric parameter used in the control sequence.
Ps	A single numeric parameter selected from a defined list of valid parameters.
Pl	A string of zero to fifteen parameters selected from a defined list of valid parameters. Multiple parameters must be separated by the semicolon (;) delimiter.

C0 Control Codes

C0 Code	Decimal	Action taken when code received:
NUL	0	Ignored.
SOH	1	Ignored.
STX	2	Ignored.
ETX	3	Ignored.
EOT	4	Ignored.
ENQ	5	Send ANSWERBACK message.
ACK	6	Ignored.
BEL	7	Generate bell tone, if bell enabled.
BS	8	Move cursor left.
HT	9	Move cursor to next horizontal tab stop.
LF	10	Line feed, or new line operation.
VT	11	Line feed, or new line operation.
FF	12	Line feed, or new line operation.
CR	13	Move cursor to left margin.
SO	14	Invoke G1 character set into GL position (LS1).
SI	15	Invoke G0 character set into GL position (LS0).
DLE	16	Ignored.
DC1 (XON)	17	If XON/XOFF support enabled, clear the XOFF state and start sending characters.
DC2	18	Ignored.
DC3 (XOFF)	19	If XON/XOFF support enabled, stop sending characters.
DC4	20	Ignored.
NAK	21	Ignored.
SYN	22	Ignored.
ETB	23	Ignored.
CAN	24	Terminate and cancel escape sequence, control sequence, or device control string.
EM	25	
SUB	26	Terminate and cancel escape sequence, control sequence, or device control string and display reverse question mark.
ESC	27	Introduce an escape sequence. Terminate any in-progress escape, control, or device control sequence.
FS	28	Ignored.
GS	29	Ignored.
RS	30	Ignored.
US	31	Ignored.
SP	32	Space.
DEL	127	Ignored.

C1 Control Codes

C1 control codes (128 to 159) can only be used directly in an 8-bit environment. However, any C1 control code can be replaced by two 7-bit codes. The first code is ESC and the value of the second code is 64 less than the value of the C1 code.

C1 Code	Decimal	7-bit equiv	Action taken when code received:
IND	132	ESC D	Index: move cursor down, scroll if at bottom.
NEL	133	ESC E	Next line: move to first position on next line, scroll at bottom.
SSA	134	ESC F	Ignored.
ESA	135	ESC G	Ignored.
HTS	136	ESC H	Horizontal Tab Set.
HTJ	137	ESC I	Ignored.
VTS	138	ESC J	Ignored.
PLD	139	ESC K	Ignored.
PLU	140	ESC L	Ignored.
RI	141	ESC M	Reverse Index: move cursor up, scroll if at top.
SS2	142	ESC N	Invoke G2 set into GL position for next graphic character only.
SS3	143	ESC O	Invoke G3 set into GL position for next graphic character only.
DCS	144	ESC P	Open a device control string.
PU1	145	ESC Q	Ignored.
PU2	146	ESC R	Ignored.
STS	147	ESC S	Ignored.
CCH	148	ESC T	Ignored.
MW	149	ESC U	Ignored.
SPA	150	ESC V	Ignored.
EPA	151	ESC W	Ignored.
CSI	155	ESC [	Introduce a control sequence.
ST	156	ESC \	Terminate a device control string.
OSC	157	ESC]	Ignored.
PM	158	ESC ^	Ignored.
APC	159	ESC _	Ignored.

Character Set Selection

ESC (final	Designate final as the G0 graphic set.
ESC) final	Designate final as the G1 graphic set.
ESC * final	Designate final as the G2 graphic set.
ESC + final	Designate final as the G3 graphic set.
	where final is one of the following:

final= B	ASCII
final= % 5	DEC supplemental (accents and diacritical marks)
final= <	User Preferred Supplemental
final= 0	DEC Special Graphics (formerly VT100 line drawing set)
final= A	ISO Latin-1
final= >	DEC Technical
final= SP @	Downline loadable character set
final= I	IBM graphics (ZSTEM extension)

Only one of the following NRC sets may be designated at a time:

final= A	British (U.K.)
final= 4	Dutch
final= 5 (or C)	Finnish
final= R	French
final= 9 (or Q)	French Canadian
final= K	German
final= Y	Italian
final= E (or 6)	Norwegian/Danish
final= % 6	Portuguese
final= Z	Spanish
final= 7 (or H)	Swedish
final= =	Swiss

Locking Shifts

SI	Invoke G0 set into GL position (default).
SO	Invoke G1 set into GL position.
ESC ~	Invoke G1 set into GR position.
ESC n	Invoke G2 set into GL position.
ESC }	Invoke G2 set into GR position (default).
ESC o	Invoke G3 set into GL position.
ESC I	Invoke G3 set into GR position.

Single Shifts

SS2	Invoke G2 set into GL position, for the next graphic character only. Equivalent to ESC N.
SS3	Invoke G3 set into GL position, for the next graphic character only. Equivalent to ESC O.

Select C1 Controls

ESC SP F	Send all C1 control codes as their 7-bit equivalents.
ESC SP G	Send all C1 control codes in 8-bit format.

Operating Level

CSI 6 1 " p	set terminal for level 1 (VT100 mode).
CSI 6 2 " p	set terminal for level 2 (VT300/8-bit mode).
CSI 6 3 " p	set terminal for level 3 (VT300/8-bit mode).
CSI 6 2 ; 0 " p	set terminal to VT300/8-bit.
CSI 6 2 ; 2 " p	set terminal to VT300/8-bit.
CSI 6 3 ; 0 " p	set terminal to VT300/8-bit.
CSI 6 3 ; 2 " p	set terminal to VT300/8-bit.
CSI 6 2 ; 1 " p	set terminal to VT300/7-bit.
CSI 6 3 ; 1 " p	set terminal to VT300/7-bit.

DEC Private Terminal Modes

CSI ? Pl h — Set one or more DEC private terminal modes.
CSI ? Pl l — Reset one or more DEC private terminal modes.

	SET	RESET	
Ps=25	visible	not visible	Text cursor enable mode.
Ps=1	Application	ANSI	Cursor key mode: keys send application control functions, or ANSI cursor control sequences.
Ps=2	N/A	VT52	Select VT52 mode.
Ps=3	132	80	Column mode.
Ps=4	Smooth	jump	Scrolling mode.
Ps=5	Reverse	normal	Screen mode.
Ps=6	Region	screen	Origin mode: home is at top of user defined scrolling region, or top left of screen.
Ps=7	wrap	no wrap	Auto wrap mode.
Ps=8	repeat	no repeat	Auto repeat mode.
Ps=18	formfeed	nothing	Printer form feed: send FF or nothing after a print screen operation.
Ps=19	screen	region	Printer extent: print entire screen or only scrolling region.
Ps=42	national	multinational	Character set mode: keyboard sends national font (7-bit chars) or multinational font(including 8-bit chars).

ESC =	Enter Application keypad mode: keypad keys send application control functions.
ESC >	Enter Numeric keypad mode: keypad keys send numeric codes, PF1 thru PF4 send control functions.

ANSI Terminal Modes

CSI Pl h — Set one or more ANSI terminal modes.
CSI Pl l — Reset one or more ANSI terminal modes.

	SET	RESET	
Ps=2	lock	unlock	Keyboard action.
Ps=4	insert	replace	Insert/replace character mode.
Ps=12	no echo	echo	Send/receive mode (controls local echo).
Ps=20	CR+LF	CR or LF	Line feed/New line mode. When set, a received LF,FF,or VT puts cursor at first column of next line; Return and Enter keys send CR+LF. When reset, a received LF,FF,or VT move cursor down; Return and Enter keys send CR.

Cursor Functions

CSI Pn A	Move cursor up.
CSI Pn B	Move cursor down.
CSI Pn C	Move cursor right.
CSI Pn D	Move cursor left.
CSI H	Move cursor home.
CSI line;col H	Move cursor to given position.
CSI line;col f	Move cursor to given position.
ESC 7	Save cursor position, graphic rendition,etc.
ESC 8	Restore cursor position, graphic rendition,etc.

Tabs

	To set a horizontal tab, refer to "C1 Codes".
CSI g	Clear a horizontal tab.
CSI 0 g	Clear a horizontal tab.
CSI 3 g	Clear all horizontal tabs.

Select Character Rendition and ISO Color

CSI Pl m Set one or more character display attributes. Visual effect of these attributes depends on your video display hardware.

Ps=0	all attributes (including color) off	
Ps=1	bold	
Ps=4	underline	
Ps=5	blink	
Ps=7	inverse video	
Ps=22	not bold	
Ps=24	not underline	
Ps=25	not blink	
Ps=27	not inverse video	
	Foreground colors:	
Ps=30	index 0	black
Ps=31	index 10	pale red
Ps=32	index 11	pale green
Ps=33	index 14	pale yellow
Ps=34	index 9	pale blue
Ps=35	index 12	pale magenta
Ps=36	index 13	pale cyan
Ps=37	index 7	white
	Background colors:	
Ps=40	index 0	black
Ps=41	index 10	pale red
Ps=42	index 11	pale green
Ps=43	index 14	pale yellow
Ps=44	index 9	pale blue
Ps=45	index 12	pale magenta
Ps=46	index 13	pale cyan
Ps=47	index 7	white

Select Character Attributes

CSI 0 " q	Characters are erasable.
CSI 2 " q	Characters are erasable.
CSI 1 " q	Characters are not erasable.

Select Line Attributes

ESC # 3	Make line the top half of a double-high, double-wide line.
ESC # 4	Make line the bottom half of a double-high, double-wide line.
ESC # 5	Make line single-high, single-wide.
ESC # 6	Make line single-high, double-wide.
ESC # 8	Display screen alignment pattern.

Editing

CSI Pn L	Insert Pn blank lines.
CSI Pn M	Delete Pn lines.
CSI Pn @	Insert Pn blank characters.
CSI Pn P	Delete Pn characters.

Erasing Characters Without Affecting Other Characters

CSI Pn X	Erase Pn characters.
CSI 0 K	Erase to end of line.
CSI K	Erase to end of line.
CSI 1 K	Erase to beginning of line.
CSI 2 K	Erase complete line.
CSI 0 J	Erase to end of display.
CSI J	Erase to end of display.
CSI 1 J	Erase to beginning of display.
CSI 2 J	Erase complete display.
CSI ? 0 K	Erase erasable chars to end of line.
CSI ? K	Erase erasable chars to end of line.
CSI ? 1 K	Erase erasable chars to beginning of line.
CSI ? 2 K	Erase erasable chars on line.
CSI ? 0 J	Erase erasable chars to end of display.
CSI ? J	Erase erasable chars to end of display.
CSI ? 1 J	Erase erasable chars to beginning of display.
CSI ? 2 J	Erase erasable chars in display.

Set Top and Bottom Scrolling Margins (Scrolling Regions)

CSI top;bottom rSet scrolling margins.

Printing

CSI ? 5 i	Auto Print on: display line is printed when cursor moves away from line.
CSI ? 4 i	Auto Print off.
CSI 5 i	Printer Controller on: received characters are sent to the printer, not to the screen.
CSI 4 i	Printer Controller off.
CSI ? 1 i	Print cursor line.
CSI 0 i	Print screen.
CSI i	Print screen.

User Defined Keys

User Defined Keys (UDK) are Shift-F6 through Shift-F20. They are defined by a device control string which has the form:
DCS Pc;Pl | key1/string1;key2/string2... ST

DCS	Device Control String code (or ESC P).
Pc=0	Clear all keys before defining.
Pc=1	Redefine only.
Pl=0	Lock UDKs.
Pl=1	Do not lock UDKs.
keyN=17	Define Shift-F6.
keyN=18	Define Shift-F7.
keyN=19	Define Shift-F8.
keyN=20	Define Shift-F9.
keyN=21	Define Shift-F10.
keyN=23	Define Shift-F11.
keyN=24	Define Shift-F12.
keyN=25	Define Shift-F13.
keyN=26	Define Shift-F14.
keyN=28	Define Shift-Help.
keyN=29	Define Shift-Do.
keyN=31	Define Shift-F17.
keyN=32	Define Shift-F18.
keyN=33	Define Shift-F19.
keyN=34	Define Shift-F20.
stringN	Up to 256 pairs of 00 thru FF codes, forming the definition.
ST	String terminator code (or ESC \).

Downline Loadable Character Sets

ZSTEM supports the dynamically redefinable character set (DRCS) provided by a VT terminal. Refer to a DEC VT Programmer Reference Manual for details of using DRCS.

Reports

The actual reports sent are shown in the descriptions of the PRIMARY and SECONDARY commands in Chapter 14.

CSI 0 c	Request primary device attributes.
CSI c	Request primary device attributes.
ESC Z	Request primary device attributes.
CSI > 0 c	Request secondary device attributes.
CSI > c	Request secondary device attributes.

Device Status Reports

CSI 5 n		Request Terminal Status:	
	CSI 0 n		Response indicates no malfunction.
	CSI 3 n		Response indicates terminal has malfunction.
CSI 6 n		Request cursor position report:	
	CSI line;column R		response
CSI ? 6 n		Request extended cursor position report:	
	CSI line;column;page R		response
CSI ? 15 n		Request printer status:	
	CSI ? 13 n		Response indicates printer was never ready.
	CSI ? 10 n		Response indicates printer ready.
	CSI ? 11 n		Response indicates printer not currently ready.
	CSI ? 18 n		Response indicates printer busy.
CSI ? 25 n		Request UDK status:	
	CSI ? 20 n		Response indicates UDKs are unlocked.
	CSI ? 21 n		Response indicates UDKs are locked.
CSI ? 26 n		Request keyboard language:	
	CSI ? 27;Pn;Ps n		Response indicates:

Pn=1	North American
Pn=2	British
Pn=3	Flemish
Pn=4	French Canadian
Pn=5	Danish
Pn=6	Finnish
Pn=7	German
Pn=8	Dutch
Pn=9	Italian
Pn=10	Swiss(French)
Pn=11	Swiss(German)
Pn=12	Swedish
Pn=13	Norwegian
Pn=14	French/Belgian
Pn=15	Spanish
Pn=16	Portuguese

Ps=0	keyboard ready
Ps=3	no keyboard
Ps=8	keyboard busy

Appendix

Locator Device Reports

CSI ? 55 n — Request locator device status:
- CSI ? 53 n — No locator device (not configured or mouse driver not loaded).
- CSI ? 50 n — Locator device ready.
- CSI ? 58 n — Locator device busy.

CSI ? 56 n — Request locator device ID:
- CSI ? 57;0 n — unknown.
- CSI ? 57;1 n — Mouse.
- CSI ? 57;2 n — Tablet.

Terminal State Reports

CSI 1 $ u — Request Terminal State Report:
- DCS 1 $ s D...D <checksums 1 and 2> ST — Terminal State Report Response

DCS 1 $ p D...D ST — Restore terminal state

CSI 2;Pn $ u — Request Color Table Report:
- Pn = 0,1,none — Request HLS report.
- Pn = 2 — Request RGB report.

DCS 2 $ s D...D ST — Color Table Report Response:

D...D	Color data in groups of five (Pc; Pu; Px; Py; Pz).
Pc	=color number (0 to 255)
Pu	=1 for HLS
	=2 for RGB
Px	=0 to 360 for HLS (hue)
	=0 to 100 for RGB (red value)
Py	=0 to 100 for HLS (lightness)
	=0 to 100 for RGB (green value)
Pz	=0 to 100 for HLS (saturation)
	=0 to 100 for RGB (blue value)

DCS 2 $ p D...D ST — Restore color state:
- D...D — Color state data as defined above.

Presentation State Reports

CSI 1 $ w — Request Cursor Information Report:
- DCS 1 $ u D...D ST — Cursor Information Report Response

DCS 1 $ t D...D ST — Restore Cursor Information

CSI 2 $ w — Request Tab Stop Report:
- DCS 2 $ u D...D ST — Tab Stop Report Response

DCS 2 $ t D...D ST — Restore Tab Stop

Mode Settings

CSI ANSImode $ p	Request information about an ANSI mode.	
CSI ANSImode; Ps $ y		ANSI mode state response
Ps	0 =unknown mode	
	1 =set	
	2 =reset	
	3 =permanently set	
	4 =permanently reset	
CSI ANSImode; ... ANSImode h	Set ANSI mode(s).	
CSI ANSImode; ... ANSImode l	Reset ANSI mode(s).	

CSI ? DECmode $ p	Request information about a DEC private mode.	
CSI ? DECmode; Ps $ y		DEC private mode state response. (Ps as above)
CSI ? DECmode; ... DECmode h	Set DEC private mode(s).	
CSI ? DECmode; ... DECmode l	Reset DEC private mode(s).	

Control Function Settings

DCS $ q D...D ST	Request control function setting. D...D = intermediate and/or final characters of function.
DCS 0 $ r D...D ST	valid control function report.
DCS 1 $ r D...D ST	invalid control function report.

Window Report

CSI " v	Request window report.
CSI lines; columns; left column; top line; page " w	Window response.

User-Preferred Supplemental Set

CSI & u	Request user-preferred supplemental set.
DCS 0 ! u % 5 ST	DEC 0Supplemental Graphic.
DCS 1 ! u A ST	ISO Latin-1 supplemental.

Resets

CSI ! p	Soft reset.
ESC c	Hard reset.
CSI z	Reset terminal.

ZSTEM Private Controls

Windows in LOCAL HELP MODE. These are described in Chapter 14.

CSI 1; height;width .z	Draw window.
CSI height;width s	Draw window. This form will not be supported in future versions. Item **Old ZSTEM Private Controls** on the General Configuration screen must be enabled.
CSI 4 J	Clear window.
CSI E	New line in window.

CSI 4; Pn .z	Remote Softkey. Described in Chapter 11.
CSI Pn t	Remote Softkey. This form will not be supported in future versions. Item **Old ZSTEM Private Controls** on the General Configuration screen must be enabled. Pn=0 through 9 execute softkey ALT+0 through ALT+9 Pn=10 through 35 execute softkey ALT+A through ALT+Z
CSI 2.z	Go into Hold Screen mode. This sequence works during a DISK READ only.
CSI 3; n .z	Stop processing for n/10 seconds.

Cursor Functions (compatible with ANSI.SYS)

CSI s	Save cursor.
CSI u	Restore cursor.

Transmitted ANSI Codes

TABLE B.1
ASCII Codes Generated by Keyboard in VT300 and VT100 Modes

	Transmitted ASCII code sequence			
	Terminal mode set to **VT300/7-bit**		Terminal mode set to **VT100**	
Key which has this VT320 function	Keypad mode set to **Numeric**	Keypad mode set to **Application**	Keypad mode set to **Numeric**	Keypad mode set to **Application**
0	0	ESC O p	0	ESC O p
1	1	ESC O q	1	ESC O q
2	2	ESC O r	2	ESC O r
3	3	ESC O s	3	ESC O s
4	4	ESC O t	4	ESC O t
5	5	ESC O u	5	ESC O u
6	6	ESC O v	6	ESC O v
7	7	ESC O w	7	ESC O w
8	8	ESC O x	8	ESC O x
9	9	ESC O y	9	ESC O y
MINUS	-	ESC O m	-	ESC O m
COMMA	,	ESC O l	,	ESC O l
PERIOD	.	ESC O n	.	ESC O n
ENTER	CR	ESC O M	CR	ESC O M
PF1	ESC O P	ESC O P	ESC O P	ESC O P
PF2	ESC O Q	ESC O Q	ESC O Q	ESC O Q
PF3	ESC O R	ESC O R	ESC O R	ESC O R
PF4	ESC O S	ESC O S	ESC O S	ESC O S
	Cursor Key mode set to **Normal**	Cursor Key mode set to **Application**	Cursor Key mode set to **Normal**	Cursor Key mode set to **Application**
UP ARROW	ESC [A	ESC O A	ESC [A	ESC O A
DOWN ARROW	ESC [B	ESC O B	ESC [B	ESC O B
RIGHT ARROW	ESC [C	ESC O C	ESC [C	ESC O C
LEFT ARROW	ESC [D	ESC O D	ESC [D	ESC O D

* in VT300/8-bit terminal mode: SS3 is sent in place of ESC O, CSI is sent in place of ESC [.

TABLE B.2
ASCII Codes Generated by Keyboard in VT300 and VT100 Modes

	Transmitted ASCII code sequence	
Key which has this VT320 function	Terminal mode set to **VT300/7-bit**	Terminal mode set to **VT100**
FIND	ESC [1 ~	ESC [H
INSERT HERE	ESC [2 ~	ESC O p
REMOVE	ESC [3 ~	ESC O n
SELECT	ESC [4 ~	ESC O q
PREV SCREEN	ESC [5 ~	ESC O y
NEXT SCREEN	ESC [6 ~	ESC O s
SHIFT+TAB	ESC [Z	ESC [Z
F6	ESC [1 7 ~	
F7	ESC [1 8 ~	
F8	ESC [1 9 ~	
F9	ESC [2 0 ~	
F10	ESC [2 1 ~	
F11	ESC [2 3 ~	
F12	ESC [2 4 ~	
F13	ESC [2 5 ~	
F14	ESC [2 6 ~	
HELP	ESC [2 8 ~	
DO	ESC [2 9 ~	
F17	ESC [3 1 ~	
F18	ESC [3 2 ~	
F19	ESC [3 3 ~	
F20	ESC [3 4 ~	

* in VT300/8-bit terminal mode: SS3 is sent in place of ESC O, CSI is sent in place of ESC [.

Appendix

C

VT52 Controls

The following VT52 functions are available when the item **Terminal mode** on the General Configuration screen is set to **VT52**.

Received VT52 Codes

Cursor Functions

ESC A	Cursor up
ESC B	Cursor down
ESC C	Cursor right
ESC D	Cursor left
ESC H	Cursor home
ESC I	Reverse line feed
ESC Y row col	Direct cursor addressing (row and col are single characters equal to the desired setting plus 37 octal)
ESC j	Save cursor position (extension)
ESC k	Set cursor to previously saved position (extension)

Erasing and Editing

ESC E	Clear display and home cursor (extension)
ESC J	Erase to end of screen
ESC K	Erase to end of line
ESC N	Delete character (extension)
ESC b	Erase to beginning of screen (extension)
ESC l	Erase entire line (extension)
ESC o	Erase to beginning of line (extension)

Modes of Operation

ESC F	Enter graphics mode
ESC G	Exit graphics mode
ESC =	Enter alternate keypad mode
ESC >	Exit alternate keypad mode
ESC p	Enter reverse video mode (extension)
ESC q	Exit reverse video mode (extension)

Configuration

ESC z	Reset to powerup configuration (extension)
ESC <	Enter VT100 mode
ESC r Ps	Modify baud rate (extension, no effect)
ESC x 7	Enter alternate keypad mode (extension)
ESC y 7	Exit alternate keypad mode (extension)
ESC x 8	Enable auto line feed on return (extension)
ESC y 8	Disable auto line feed on return (extension)
ESC x 9	Enable auto return on line feed (extension)
ESC y 9	Disable auto return on line feed (extension)
ESC Z	Identify as VT52 (transmits ESC /Z)

Printer Functions

ESC ^	Enter auto print mode
ESC _	Exit auto print mode
ESC W	Enter printer controller mode
ESC X	Exit printer controller mode
ESC]	Print screen
ESC V	Print cursor line

Remote Softkeys

See Chapter 11 for details on these ZSTEM private functions.

ESC t nn	nn=00 through 09 execute softkey ALT+0 through ALT+9
	nn=10 through 35 execute softkey ALT+A through ALT+Z

Appendix

Transmitted VT52 Codes

TABLE C.1
ASCII Codes Generated by Keyboard in VT52 Mode

Press the key which has this VT340 function...	...to emulate this VT52 key.	Transmitted ASCII code sequence	
		Keypad mode set to **Numeric**	Keypad mode set to **Application**
0	0	0	ESC ? p
1	1	1	ESC ? q
2	2	2	ESC ? r
3	3	3	ESC ? s
4	4	4	ESC ? t
5	5	5	ESC ? u
6	6	6	ESC ? v
7	7	7	ESC ? w
8	8	8	ESC ? x
9	9	9	ESC ? y
MINUS		-	ESC ? m
COMMA		,	ESC ? l
PERIOD	PERIOD	.	ESC ? n
ENTER	ENTER	CR	ESC ? M
PF1	blue	ESC P	ESC P
PF2	red	ESC Q	ESC Q
PF3	gray	ESC R	ESC R
PF4		ESC S	ESC S
UP ARROW	UP	ESC A	ESC A
DOWN ARROW	DOWN	ESC B	ESC B
RIGHT ARROW	RIGHT	ESC C	ESC C
LEFT ARROW	LEFT	ESC D	ESC D
FIND		ESC H	ESC H
INSERT HERE		ESC ? p	ESC ? p
REMOVE		ESC ? n	ESC ? n
SELECT		ESC ? q	ESC ? q
PREV SCREEN		ESC ? y	ESC ? y
NEXT SCREEN		ESC ? s	ESC ? s
SHIFT+TAB		ESC -	ESC -

INDEX

Configuration items appear as:
Name of item (NAME OF SCREEN), ...

A

B

C

D

E

F

G

H

I

K

L

M

N

O

P

T

U

V

W

X

Y

Z

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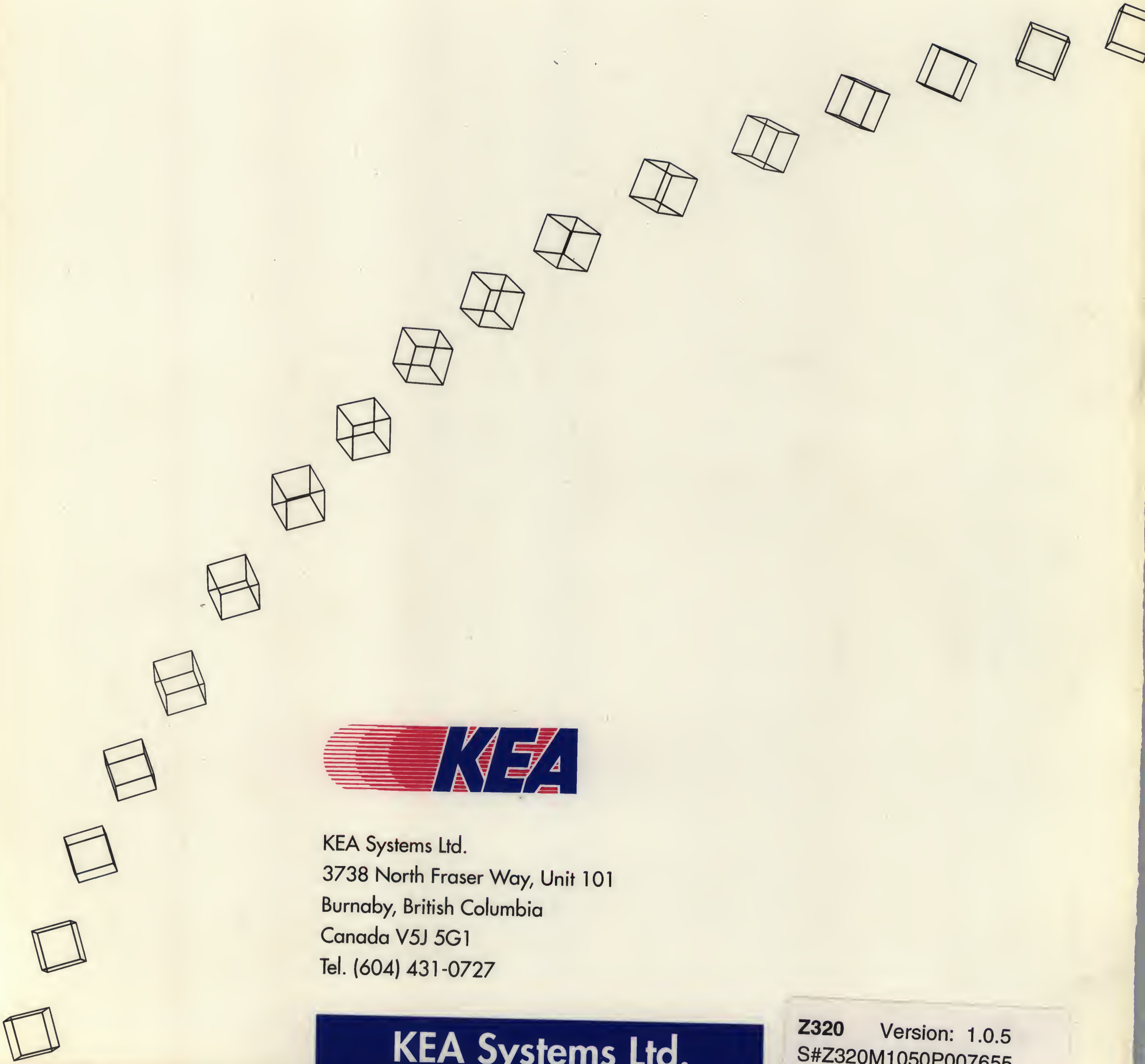

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